

ARTICLES

Herpetological Review, 2018, 49(2), 189–207.
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Erroneous Environs or Aberrant Activities? Reconciling Unexpected Collection Localities for Three New Guinea Worm-eating Snakes (*Toxicocalamus*, Serpentes, Elapidae) Using Historical Accounts

In contrast to birds and large mammals, which can usually be observed and recognized using binoculars and field guides, many reptile and amphibian species are secretive, rarely seen, and difficult to identify from a distance. The characters that separate closely related snakes or lizards often revolve around some finite details of the head or body scalation rather than highly visible color patterns, and these are essentially impossible to discern without close inspection; sometimes these characteristics are difficult to determine even up close, without magnification. Therefore, while many bird and mammal distribution maps may be compiled from non-invasive observations, often by armies of experienced amateurs, the ranges of many reptile species often depend on the locality data that should accompany museum specimens whose identity has been established. If such data are inaccurate or erroneous, it may then easily lead to misconceptions regarding the range and conservation status of a particular species – to use a computing term, garbage in, garbage out!

Throughout the following text, we employ museum abbreviations as listed by Sabaj (2016).

FOUR SPURIOUS SPOTS

In order to clarify how the issue of flawed locality data has influenced understanding of species distributions, we present four prominent examples for how and why specimens became incorrectly documented. We selected these because we found additional information regarding each as we surveyed the historical literature.

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Malayopython timoriensis (Peters, 1876).—It is noteworthy that the confusion over type localities persists even for well-known species that are popular in the reptile trade. A good example for this is the colorful Lesser Sunda python, *Malayopython timoriensis*. The species is endemic to the Lesser Sunda Island chain of Indonesia, and its type locality was given as Kupang, the main port of Dutch Timor near the western end of the island. Peters (1876) reported on a series of specimens obtained in Kupang in May 1875 by the crew of the SMS *Gazelle*. In the general report of the discoveries made on this voyage (Studer 1889), the author explained that the specimens listed for Timor included a donation from a botanist associated with the Botanical Gardens in Buitenzorg (now Bogor, Indonesia), a Dr. de Jong (Fritzsche and Fritzsche 1908), namely “[e]ine Sammlung timoresischer Reptilien, in Spiritus konservirt” [a collection of Timorese reptiles, preserved in denatured ethanol]. Whereas other snakes in the shipment from Timor were listed with the specific localities and habitats in which they were captured, the specimens donated by de Jong were listed without specific locality information. Regardless of where these specimens actually originated, they were considered as having been obtained on Timor. Thus, the python specimen in the reptile shipment from de Jong became the holotype of what is now known as *M. timoriensis* and was accessioned into the collection of the Museum für Naturkunde, Berlin under the catalog number ZMB 8927—with Timor as its collecting locality.

In his description of the python, Peters (1876:533) used only the name *Liasis amethystinus* in the main text, and the currently valid species name *timoriensis* is based on Peters's caption to Figure 3 of the included plate, as “idem var. *timoriensis*” (without italics in the original, and referencing the adjacent Figure 2). Based on the specimen transfer from de Jong, it is actually not possible to determine the provenance of this python specimen with certainty. It is known that offering reptiles in trade to visiting scientists was not uncommon at the time (e.g., D'Albertis 1880:200), and with the excitement over the considerable diversity observed, locality information may have been omitted. With Kupang historically an important port and with no reason to doubt that the donated specimens would not also have been obtained on Timor, Peters coined the species

name in the mistaken belief that the specimen was actually a local one.

There may not be any fault on the part of the donor, de Jong. In the 18th and 19th Centuries, Kupang was a port of considerable significance in the southeastern Dutch East Indies. It was the main port for vessels to replenish supplies on the way from the Southeast Asian mainland to Australia, and its stability and significance were enough to make it the destination for William Bligh and his crew after the mutiny on the *Bounty* in 1789 (Bligh 1790). At that time, most cargo would arrive in small boats from other islands throughout the Lesser Sunda Archipelago, whether loaded with sandalwood, spices, or scientific specimens of plants and animals, and these goods would accumulate on Kupang's docks for onward shipping to Europe. Given the flow of commodities from the nearby islands, de Jong's specimen most likely originated on Flores or, if not there, then on one of the other Inner Banda Arc islands where the species is known to occur (e.g., Lombok, Solor, Adonara, Lembata, or Pantar). It is now generally accepted that this species does not and never did occur in the Outer Banda Arc, where Timor is the largest island (Barker and Barker 1996; McDiarmid et al. 1999; O'Shea 2007; O'Shea et al. 2012; Schleip and O'Shea 2010), yet the common name "Timor python" persists in the pet trade, a misnomer derived from its erroneous type locality and specific epithet.

Cryptoblepharus schlegelianus (Mertens, 1928).—More subtle errors related to locality also exist. The type locality of the snake-eyed skink, *Cryptoblepharus schlegelianus*, is often given as Timor (Horner 2007), but recent work detailing the history and provenance of the type specimen shows that it was most likely collected on the small island of Semau, located less than 5 km W of Timor (O'Shea et al. 2015), and merely shipped from Kupang. We have been unable to locate any specimens of *C. schlegelianus sensu stricto* in museum collections with a verified locality on Timor. Timorese specimens exhibit differences in their scalation, patterning, and ecology (HK, *pers. obs.*) and are best referred to as *Cryptoblepharus cf. schlegelianus*. *Cryptoblepharus schlegelianus* is therefore a vulnerable Semau Island endemic and not a widely distributed species, as might otherwise be believed.

Sistrurus catenatus (Rafinesque 1818).—A North American example of an incorrectly documented locality permeating down through 166 years, unquestioned until recently (Beauvais 2016), concerns a specimen of Massasauga rattlesnake (*Sistrurus catenatus*), catalogued as MCZ R-388 and collected by the Swiss-American herpetologist Louis Agassiz (1807–1873) on 22 June 1848 "on the southern extremity of Lake Huron," Michigan, USA. The title of Agassiz's report (Agassiz 1850), *Lake Superior: its physical characters, vegetation and animals compared with those of other and similar regions*, makes it plain that his primary goal was to survey Lake Superior, and this had led subsequent authors to include this specimen in the herpetofauna of that larger lake to the north, missing Agassiz's comment on p. 382 that "The specimen^[1] was caught on the southern extremity of Lake Huron." Agassiz then continued, "Besides those species, the following reptiles occur about Lake Superior." Thus, a record from a locality far to the south (ca. 300 km by air) has been used to validate the occurrence of the species in the entire Lake Superior area ("about Lake Superior" as stated by Agassiz).

Vini peruvianus (Statius-Müller 1776).—This problem is not confined to non-avian reptiles. Philipp Ludwig Statius-

Müller^[2] (1725–1776) was a German zoologist/entomologist who translated Linnaeus's *Systema Naturae* into German, and in his attached supplements he described a number of new taxa. Prominent among these is *Psittacus peruvianus* Statius-Müller, 1776, the Blue Lorikeet (now *Vini peruviana*). In his text, Statius-Müller (1776:80) included the comment "Sein Vaterland ist Peru" [his place of origin is Peru]. This parakeet is actually an inhabitant of French Polynesia (Forshaw and Knight 2017), and the specimen had merely been shipped to Europe via Peru.

COLLECTOR-CAUSED CONUNDRUMS

An additional problem arising from early collections may have simply been the collectors' lack of awareness or comprehension that an accurate recording of locality data could be critically important for future studies. It is well known that Charles Darwin lumped many of his Galapagos specimens together, without concern for their specific island origins, or else he labeled them retrospectively, which also resulted in potentially erroneous locality data (Sulloway 1981). When collecting expeditions lasted many months, or even years, and involved the participation of many assistants or agents handling the logistics of transportation, it is hardly surprising that the associated data relating to the specimens may have become lost, confused, or otherwise dissociated from the specimens to which they applied.

This situation may have been exacerbated when collections arrived at museums via shipping companies, with collectors remaining overseas, or when the taxa concerned were not the primary interest of the field collectors and museum staff. This is especially the case with reptiles and amphibians, which were often viewed as by-catch by an expedition's entomologist, ornithologist, ethnologist, or physician. Even large and highly organized expeditions, such as the seven Archbold Expeditions of the American Museum of Natural History to New Guinea during the 1930s and 1950s, usually did not include an herpetologist, and the importance of specimens they collected was often not recognized until decades later when the field collectors had died and were unable to comment further on the scant, and potentially inaccurate, notes attached to their specimens.

As herpetologists in the 21st Century, we now regularly find ourselves relying on 19th and early 20th Century collections as the only records for scarcely encountered or rare species. These specimens are often accompanied by incomplete or misleading locality or natural history notes, and we are obliged to engage in "forensic historical herpetology," seeking out the dates and names of vessels on which early collectors travelled, the ports at which they docked, and the routes they took into the hinterland on their collecting forays. Thus, we tried to determine whether in three instances of specimens with particularly dissatisfying locality information this dissatisfaction derived from errors in documentation—producing "erroneous environments"—or whether it could be due to the species' range truly extending farther than what had been considered possible—an "aberrant

[1] In his 1850 report, Agassiz referred to *Sistrurus tergeminus* (Say, 1823) as *Crotaphorus tergeminus*.

[2] There is some disagreement over the author's name, with uncertainty about whether the last name includes Statius or not. According to Kooiman (1950) and Tielke (1997), the Dutch family Statius moved to northwestern Germany and there appended the commonly used surname Müller to their name. In common usage, which is what Tielke (1997) proposed and what we follow here, such an addition would be hyphenated and include the umlaut.

activity” in terms of the spread of the animals, perhaps via human introduction, but a real finding (for a recent example of an aberrant activity in the genus *Lycodon*, see O’Shea et al. [2018]).

FIXING THE FLAWS

One might ask why it is important to determine the geographical origins of long-dead specimens. Misidentifications of specimens, or the acceptance of inaccurate or completely erroneous locality data, can result in species being documented as much more widely distributed in nature than they actually are (e.g., Hartmann et al. 2016; Kieckbusch et al. 2016). The results of such disinformation can create a multitude of problems, ranging from conservation issues, when an overestimation of population range and size may lead to reduced protection for localized species that may be endangered, to public health concerns, such as when an overestimated distribution for a species may lead to the application of inappropriate snakebite antivenom.

If one does not wish to accept a dubious collection record at face value, the first stage is to examine the specimen in order to determine whether a misidentification has occurred and is the cause of the disparity. Once satisfied that the specimen is indeed a representative of its purported taxon, the next stage is to investigate the history of its collection to determine how it came to be geographically separated from its conspecifics.

TOXICOCALAMUS TRAILS AND TRIALS

In our research into the endemic New Guinea elapid genus *Toxicocalamus*, the localities for five specimens were puzzling to us. Instead of simply accepting the localities at face value, we opted to sleuth out whether the incongruous distributions were real (and constituted “aberrant activities” on the part of the snakes), or whether they resulted from “administrative” errors (and the localities would therefore be “erroneous environs”). We encountered three specimens belonging to otherwise extremely localized Milne Bay Province, Papua New Guinea (PNG) island taxa that were documented as having been collected at localities far distant from their conspecifics. We also found two specimens belonging to a much more widely distributed taxon, but purportedly collected far outside its known range. Of these five specimens, one is clearly a misidentification and represents an undescribed species, which we are in the process of describing (O’Shea and Kaiser, in prep.), and another requires a great deal more sleuthing; the remaining three specimens are dealt with herein.

The first of these is a specimen of Woodlark Island Snake, *T. longissimus* Boulenger, 1896 (BMNH 1904.11.1.60), reportedly collected on Fergusson Island in the d’Entrecasteaux Archipelago, Milne Bay Province, PNG, 200 km W of Woodlark Island, by the British naturalist Albert Stewart Meek, at some point between 1897–1913. The second is a specimen of Misima Island *T. misimae* McDowell, 1969 (AM R.7614), recorded as having been collected in the Mekeo region of Central Province, PNG, on mainland New Guinea, approximately 700 km NW of Misima Island, by the Australian bird collector Charles W. Camp in 1921. The third is a specimen of *T. preussi angusticinctus* (Bogert and Matalas, 1945) (MSNG 54100) that was collected by the Italian naturalist-explorer Luigi Maria d’Albertis (1841–1901), reportedly at Katau on the southern coast of Western Province, PNG, approximately 400 km SSE of this taxon’s known range in the Upper Fly River system.

The incongruity of these three specimens was an irritation to us, particularly because we have been forced to rely on historic records for many of our concepts related to species distributions. We therefore felt the urgency to determine whether there could be any doubt about these records, which in the context of our overall findings for the genus *Toxicocalamus* did not make sense. While our research does not provide absolute certainty for these questionable records, we feel that in each case there should be reasonable doubt as to the veracity of the stated localities, and reasonable cause to accept our conclusions.

MATERIALS AND METHODS

The latitudes, longitudes, and approximate elevations of important localities mentioned in the text are listed in Appendix 1. Dorsal scale counts were taken at approximately one head length posterior to the head, at midbody, and at approximately one head length anterior of the cloaca.

THE GENUS *TOXICOCALAMUS*, ITS GEOGRAPHY, AND GEOLOGY

The endemic New Guinea elapid genus *Toxicocalamus* currently comprises fourteen species (Uetz et al. 2018) whose distribution could be summarized as ‘highland or island.’ Most of the mainland species are found at relatively high elevations in the Central Cordillera of New Guinea or on other mountain ranges, including the Owen Stanley and Torricelli Ranges. Insular populations and species are found on Woodlark Island and the islands of the Louisiade and d’Entrecasteaux Archipelagos to the east of the Papuan Peninsula, and on small continental islands along the northern coast of New Guinea (Karkar, Tarawai, Walis, Seleu).

The origin of Australasian elapids.—The subfamily Hydrophiinae comprises the seasnakes, sea kraits, and all terrestrial Australian and Melanesian elapids, and forms a group distinct from the Elapinae, which includes the Afro-Asian and American elapids. The ancestral lineage within the Hydrophiinae is the oviparous, aquatic but semi-terrestrial sea krait genus *Laticauda* (Keogh 1998; Lane and Shine 2011; Metzger et al. 2010; Sanders et al. 2008; Strickland et al. 2016), a genus of Oriental origin that subsequently reinvaded the land in Melanesia where the most primitive terrestrial genus is believed to be the Fijian *Ogmodon*, followed by the more derived Solomon *Salomonelaps* and *Loveridgelaps*^[3], and then the Papuan *Toxicocalamus* and *Micropechis* (Strickland et al. 2016). Strickland et al. (2016) provide a more detailed discussion on the early radiation of the hydrophiine elapids.

Of arcs and terranes.—Southern New Guinea comprises the northern edge of Meganesia (sensu Filewood 1984; Heinsohn and Hope 2006), a NNE-moving tectonic plate that may also be termed the Australian Craton^[4] (Pigram and Davies 1987). The geographical region encompassed by this definition is sometimes also known as Sahul (Heinsohn and Hope 2006), after the submarine shelf on which it lies, Greater Australia (Heinsohn and Hope 2006), or Australinea (sensu Dawkins 2004). Meganesia also includes continental Australia and Tasmania, and it was

[3] According to Strickland et al. (2016), the position of the Bougainvillean endemic elapid genus *Parapistocalamus* within this phylogeny has yet to be determined.

[4] A craton is an old and stable part of a continental portion of the Earth’s crust.

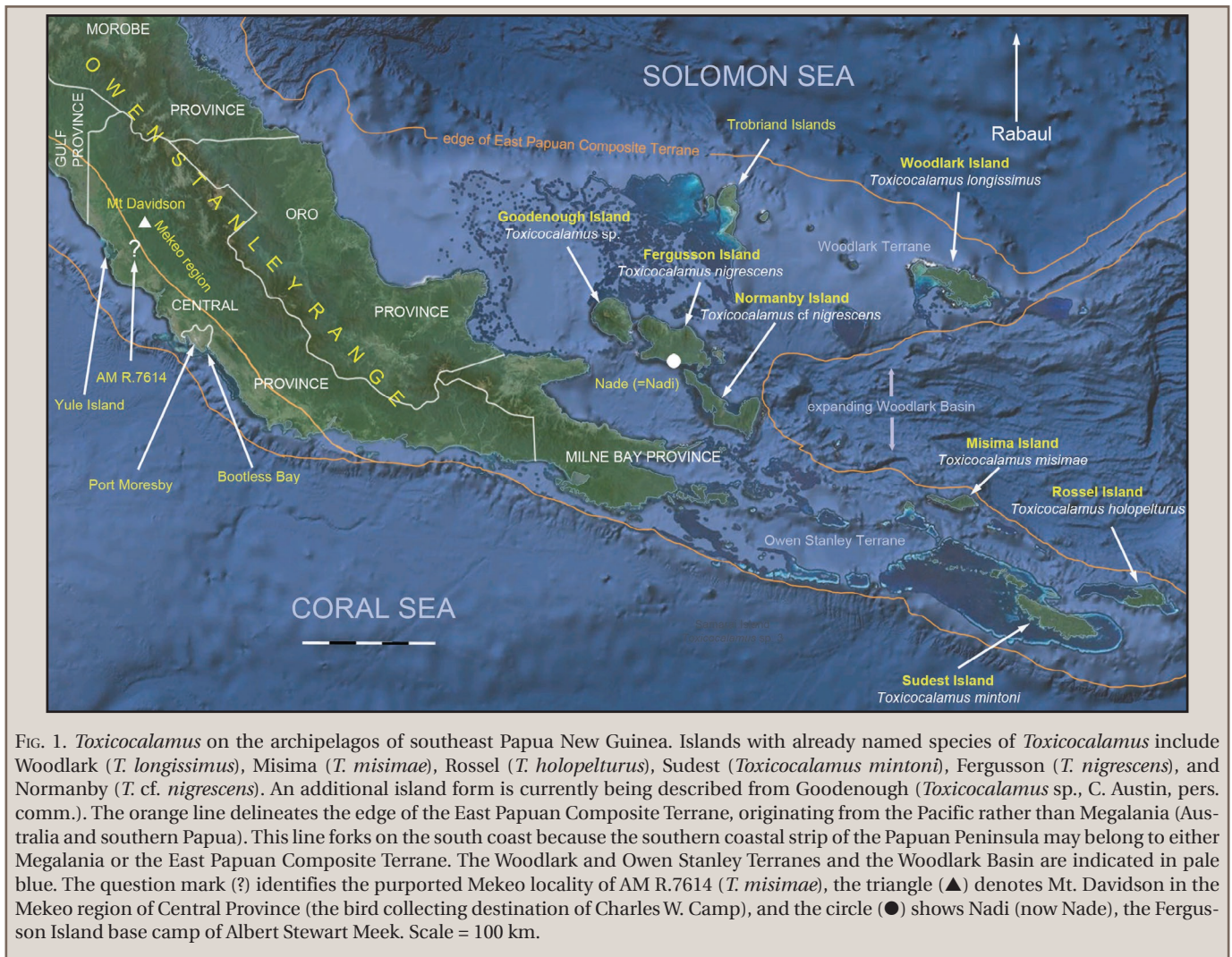


FIG. 1. *Toxicocalamus* on the archipelagos of southeast Papua New Guinea. Islands with already named species of *Toxicocalamus* include Woodlark (*T. longissimus*), Misima (*T. misimae*), Rossel (*T. holopelturus*), Sudest (*Toxicocalamus mintoni*), Fergusson (*T. nigrescens*), and Normanby (*T. cf. nigrescens*). An additional island form is currently being described from Goodenough (*Toxicocalamus* sp., C. Austin, pers. comm.). The orange line delineates the edge of the East Papuan Composite Terrane, originating from the Pacific rather than Megalania (Australia and southern Papua). This line forks on the south coast because the southern coastal strip of the Papuan Peninsula may belong to either Megalania or the East Papuan Composite Terrane. The Woodlark and Owen Stanley Terranes and the Woodlark Basin are indicated in pale blue. The question mark (?) identifies the purported Mekeo locality of AM R.7614 (*T. misimae*), the triangle (▲) denotes Mt. Davidson in the Mekeo region of Central Province (the bird collecting destination of Charles W. Camp), and the circle (●) shows Nadi (now Nade), the Fergusson Island base camp of Albert Stewart Meek. Scale = 100 km.

formerly part of East Gondwana (Ali and Aitchison 2008). By the Mid-Tertiary, approximately 45–40 MYA, Meganesia had separated from what would become Antarctica (White 2006) and begun to move NNE, with southern New Guinea in its vanguard, only to collide with a series of island arcs belonging to the WSW-moving Pacific Plate (Pigram and Davies 1987). These island arcs accreted to the leading edge of Meganesia as a series of terranes^[5]. Northern New Guinea is comprised of at least 32 such terranes, many of them composite in nature (Pigram and Davies 1987).

The first terrane to become accreted was the Sepik Terrane, which docked with what is today central New Guinea during the late Oligocene (25 MYA) (Pigram and Davies 1987). The second terrane to accrete with Meganesia included the northern and western portion of the East Papuan Composite Terrane (Fig. 1). This terrane comprises a series of smaller accreted terranes of diverse Oligocene origins that docked with Meganesia during the mid- to late Miocene (15–5 MYA), forming most of the Papuan Peninsula and the d'Entrecasteaux Archipelago, although the eastern portion of this terrane may not have docked with the Louisiade Plateau, a southeastern extension of Meganesia, un-

til slightly later (Pigram and Davies 1987). When the incoming southwestward-moving terranes collided with the northward-moving Australian Craton the collisions caused a crumpling and uplifting of the leading edge of the craton to form the New Guinea Highlands, the Owen Stanley Range on the Papuan Peninsula, and the Torricelli, Bewani, Prince Alexander and Adelbert Ranges in the northern coastal lowlands. Collectively these ranges are known as the New Guinea Orogen^[6] (Pigram and Symonds 1991). It is these terranes that are believed to have transported the hydrophiine elapids and enabled them to colonize Meganesia, radiate south to Australia, and speciate greatly, before recolonizing New Guinea with Australo-Papuan elapids and reinvading the oceans as the viviparous seasnakes (Strickland et al. 2016).

Whither the worm-eaters?—It is interesting to note that the distribution of the primitive Papuan genus *Toxicocalamus* almost mirrors the underlying geology, with populations largely occurring in areas of non-Meganesian origin. *Toxicocalamus* is found throughout the Central Cordillera of New Guinea, which was created by repeated collisions and subsequent uplifting of incoming island arcs with Meganesia. *Toxicocalamus* popula-

[5] Terrane is a geological term, short for “tectonostratigraphic terrane,” for a piece of the Earth's crust, which has become detached from one tectonic plate and become attached or accreted to another plate.

[6] Orogen is a geological term for the “fold mountains” created when the leading edge of a continental plate is crumpled and forced upwards by collisions with another plate or a series of terranes. This process of mountain forming is called orogenesis.



FIG. 2. Collection localities of *Toxicocalamus longissimus* on Woodlark Island, Milne Bay Province, Papua New Guinea. Localities include Suloga Harbour (probable locality for BMNH 1946.1.18.92–93, the paralectotype and lectotype), Unapoi homestead (BPBM 17888), Guasopa (AM R.124858, 124904, BPBM 17885–87), Kulumadau (AMNH R-76619, 76629–30, BPBM 42185); Waimunon Bay (BPBM 39702), and Dikoias (BPBM 42183–84). No locality data exists for one specimen (AM R.46845). Scale = 10 km.

tions are also found on isolated mountain ranges along the northern coast of New Guinea, such as the Torricelli and Adelbert Ranges, which originated as island arc terranes, and down the Owen Stanley Range on the Papuan Peninsula, into the d'Entrecasteaux and Louisiade Archipelagos, also believed to be of Pacific island arc origin. *Toxicocalamus* does not appear to occur in the great southern lowlands of Western Province, PNG, and southeastern Papua Province, Indonesia, nor the Schouten Islands of Cenderawasih (formerly Geelvink) Bay, Papua Province, all geologically part of Meganesia. The Vogelkop Peninsula of West Papua Province, Indonesia, is seemingly also devoid of *Toxicocalamus* records, although the Tamrau and Arfak Mountains on the Vogelkop are of island arc origin, and specimens of *T. loriae sensu lato*^[7] and *T. stanleyanus* have been collected in the Fak Fak Mountains on the Bomberai Peninsula, confirming the presence of populations of *Toxicocalamus* in West Papua. The Fak Fak Mountains were formed as a result of uplifting due to island arc collisions to the west, as were the Kumawa Mountains, also on the Bomberai Peninsula. It may, therefore, be possible to predict where *Toxicocalamus* species are to be found by concentrating on the non-Meganesian mountain ranges and islands in the west, north, and east of New Guinea. The New Britain and Banda island arcs are offshore terranes that have yet to contact New Guinea, but they may be expected to collide and accrete to the landmass over the next ten million years (Polhemus 2007).

Several species of *Toxicocalamus* are found on the islands to the southeast of Papua New Guinea (Fig. 1), including *T. longissimus* from Woodlark Island, *T. holopelturus* from Rossel Island, *T. mintoni* from Sudest Island, and *T. misimae* from Misima Island, the latter three being located in the Louisiade Archipelago of Milne Bay Province, PNG. Prior to the north–south expansion of the submarine Woodlark Basin, which began in the Pliocene (ca. 5–2 MYA), Woodlark Island, which lies on a ridge known as the Woodlark Terrane on the northern edge of the basin, would have

been located much closer to the Louisiade Archipelago at the eastern end of the Owen Stanley Terrane, rather than its present isolated position would suggest (Pigram and Davies 1987). The cosmopolitan and widely distributed species complex *T. loriae sensu lato* has been recorded from Fergusson and Normanby Islands in the d'Entrecasteaux Archipelago, but these island populations are now thought to represent cryptic undescribed species (Fred Kraus, pers. comm.), including the recently described *T. nigrescens* from Fergusson Island. Similarly, a taxon listed as *Toxicocalamus* sp. (Chris Austin, pers. comm.) from Goode-nough Island in the d'Entrecasteaux Archipelago is also believed to represent a new island species. It seems probable that most of the main islands of the d'Entrecasteaux Archipelago are inhabited by endemic species, in common with Woodlark Island and the islands of the Louisiade Archipelago.

QUESTIONABLE LOCALITY 1:

TOXICOCALAMUS LONGISSIMUS ON FERGUSSON ISLAND

Types and confirmed records (Fig. 2).—The female syntypes of *Toxicocalamus longissimus* (BMNH 1946.1.18.92–93^[8], formerly BMNH 96.7.8.17–18), were collected on Woodlark Island by the British naturalist-collector Albert Stewart Meek (1871–1943; Fig. 3A,C).

Meek was primarily engaged in the collection of birds, butterflies, beetles, and mammals for Baron Walter Rothschild's private museum at Tring, Hertfordshire, England^[9]. Meek and

[8] An original BMNH accession number beginning with a two-digit prefix (e.g., 96.7.8.00) refers to the year, month and day of accession in the 19th Century. From the beginning of the 20th Century four-digit prefixes were used for the year (e.g., 1912.00.00.00). At the outbreak of World War II, the British Museum of Natural History moved as many specimens as possible to places of safety, including the Tring Museum and stately homes around the country, to avoid their destruction if the museum suffered a direct hit, which it did on several occasions. Glass jars containing specimens in 60–70% ethanol represented a significant fire risk and might have been less welcome stored in inhabited buildings, so caves or mines were used. It was reported to the Trustees of the BMNH that "... type specimens in spirit were removed from all Sections of the Department in the autumn of 1941 and deposited packed in wooden boxes and sawdust in a disused hearth-stone mine at Godstone, Surrey." The process of moving the type material took five weeks, while non-type material was moved to basement areas of the museum. When the type specimens were returned to the collection they were re-accessioned back into the collection, with new accession numbers, in the case of the snakes with a 1946 prefix. The original accession number tags were, of course, left *in situ* (Long 1981).

[9] Walter, 2nd Baron Rothschild (1868–1937) was probably one of the most influential, eccentric, and richest of Victorian gentlemen naturalists. He hired naturalists and collectors to travel all over the globe in search of specimens for his private museum at Tring, Hertfordshire, including to New Guinea. These employees included several notables, such as the entomologist Antwerp Edgar Pratt (1852–1924), and the ornithologists Alexander "Sandy" Wollaston (1875–1930), Albert Stewart Meek, and Ernst Mayr (1904–2005). Baron Rothschild established his museum in 1889 with land and money given to him by his father as a 21st birthday present. In 1892 the museum was opened to the public as one of the largest private natural history collections in the world. Upon his death, in 1937, the museum at Tring was gifted to the British nation and it became part of the British Museum (Natural History), now known as the Natural History Museum (Rothschild 1983).

[7] Based on morphological evidence (unpubl. data) and a discordant geographic distribution of available specimens, we believe that *T. loriae*, as currently defined, to be a species complex (see also Strickland et al. 2016). We here refer to specimens of uncertain species affinity, but currently treated as belonging to *T. loriae*, as *T. loriae sensu lato*.

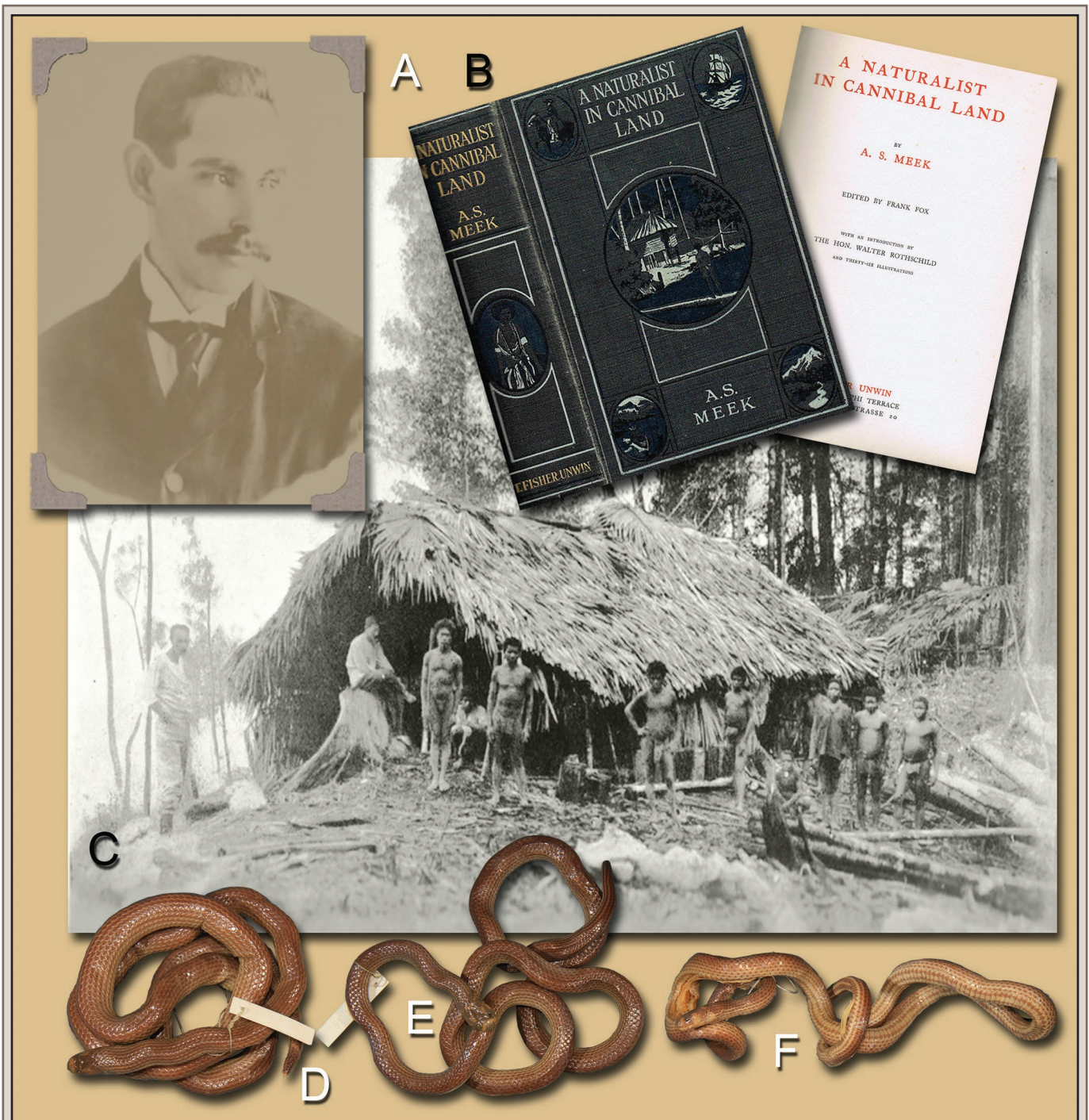


FIG. 3. Collage of images documenting Albert Stewart Meek's Papuan expeditions (1895–1897). A) British naturalist-collector Albert Stewart Meek (1871–1943). Photographer unknown. B) A. S. Meek's *A Naturalist in Cannibal Land* (1913). C) Meek at his Snow Mountains camp in Dutch New Guinea. Photograph reproduced from Meek's book, facing page 223). D–F) A. S. Meek's specimens of *Toxococalamus longissimus*. D) Paralectotype (BMNH 1946.1.18.92, formerly BMNH 96.7.8.17) and (E) lectotype (BMNH 1946.1.18.93, formerly BMNH 96.7.8.18) from Woodlark Island. F) The putative Fergusson Island specimen (BMNH 1904.11.1.60).

his three assistants^[10] arrived on Samarai Island^[11] (10.6125°S, 150.6633°E) in 1894, from whence he travelled to Fergusson Island, 110 km due north in the d'Entrecasteaux Archipelago, and established his base camp at Nadi (now Nade; 9.6664°S, 150.6956°E) on the southern coast below Mt. Edgwaba. After four months of collecting, he returned to Cooktown, Queensland, by way of Samarai, in order to dispatch his first batch of specimens to Baron Rothschild in England. While he was away, he had given instructions for his camp to be moved to the Trobriand Islands, approximately 80 km north-northeast of Fergusson Island, travelling there himself in early 1895 and remaining for five months. However, Meek found the Trobriands less productive than Fergusson, so he decided to venture to Woodlark, approximately 150 km to the southeast.

Meek arrived on Woodlark in mid- to late 1895 aboard the schooner *SS Ellengowan II*^[12], setting up his base camp at

[10] Meek was a close friend of settler, cattle rancher, and keen entomologist and ornithologist George Barnard (1831?–1894), from Coomoolboolaroo Station, Queensland, and he stayed with him for extended periods. On his first expedition to New Guinea Meek engaged two of Barnard's sons as field assistants; Henry Greensill (Harry) Barnard (1869–1966) and Wilfred Bourne (Tim) Barnard (1870–1940). Wilfred Barnard suffered badly from rheumatoid arthritis, and he would soon need to return to Australia, but Henry Barnard remained with Meek for the remainder of the expedition and would eventually become a respected Australian naturalist (Ingram 1993). Meek's third assistant was a Mr. Gulliver, for whom he does not provide a first name though he writes that Gulliver was a New Forest collector. The Gulliver family, from Brockenhurst, were well known foresters and lepidopterists (Oates 2015).

[11] Tiny Samarai Island (area 22 hectares) is located approximately 4 km south of the southeastern tip of the island of New Guinea. Discovered in April 1873, and named Dinner Island, by Captain John Moresby (1830–1922) of HMS *Basilisk*, Samarai Island was adopted by the Reverend Samuel MacFarlane (1837–1911) of the London Missionary Society (LMS) as the chief mission station for southeast Papua (Oram 1972b). In 1888 the LMS moved to nearby Kwato Island (10.6139°S, 150.6322°E), and Samarai Island became the administrative center for the Colony of British New Guinea (Joyce 1972), an administrative unit that comprised the southeastern quarter of the island of New Guinea. Samarai continued to be an important European settlement and a center for both the mining and plantation industries, even after the passing of the Papua Act of 1905, which, in 1906, transferred administrative control of the renamed Territory of Papua to the Commonwealth of Australia (Legge 1972). Its importance was to decline with the establishment of a new administrative headquarters at Port Moresby, the present day capital of Papua New Guinea, and in 1968 the establishment of Alotau, on mainland Milne Bay, as the regional headquarters (Oram 1972b). However, the decline may have begun in 1926 when Lieutenant-Governor Sir Hubert Murray (1861–1940) suggested that compared to the growing Port Moresby, Samarai had “lost heart” (Oram 1972b). During the late 19th and early 20th Centuries, Samarai was the principle entrepôt for British New Guinea and then the Territory of Papua (Oram 1972a) with most administrators, missionaries, traders and naturalists making landfall on Samarai Island before venturing further into New Guinea.

[12] Not to be confused with the *SS Ellengowan*, a schooner owned by the Reverend Samuel Macfarlane (1837–1911) of the London Missionary Society (LMS), on which the Italian naturalist-explorer Luigi Maria D'Alberty (1841–1901) made his first ascent of the Fly River in 1875 (D'Alberty 1879, 1880; O'Shea et al. 2016). After it had been sold by the LMS, the *Ellengowan* sank in 1881, was refloated in 1885, and sank again in 1888 (Searcy 1909). The *SS Ellengowan II* operated between Cooktown, Queensland, Australia, and Samarai, Milne Bay, PNG, and was still operating in the 1890s.

Suloya (now Suloga, 9.2189°S, 152.7586°E) on the island's south coast (Meek 1913). By the time Meek's expedition had reached Woodlark, he had lost two of his three assistants to “fever,” presumably malaria. Msrs. Gulliver and Wilfred Barnard had both set out for Cooktown, Gulliver from the Trobriands, Barnard from Woodlark, but Gulliver died on Samarai. Meek was also repeatedly affected by fever, but he continued to collect and, when collecting was not profitable, he tried his hand at prospecting for gold, earning around £250 in six months (Meek 1913), a considerable sum in the 1890s^[13].

In 1896, Meek again returned to Cooktown with his collections, additionally purchasing Wilfred Barnard's collection (who had given up natural history collecting) for £500 (Ingram 1993), after which Meek returned to England for three months. It is highly probable that it was during this visit when the two specimens (BMNH 96.7.8.17–18) were presented to George Albert Boulenger (1858–1937), at that time a First Class Assistant (equivalent to a Curator) in the BMNH Zoology Department, and culminating in Boulenger's description of *T. longissimus* as the type species of the genus *Toxicocalamus* (Boulenger 1896). McDowell (1969) later designated BMNH 1946.1.18.93, a specimen whose skull had been extracted and cleaned, as the lectotype, rendering BMNH 1946.1.18.92 a paralectotype. It seems probable that both of these specimens could have been collected near Meek's camp at Suloya, today's Suloga, a sheltered, shallow-water, natural harbor area. The undamaged condition of these snakes suggests they were collected by Meek or his assistants rather than purchased from locals. Specimens traded from villagers were often severely damaged, such as the two Dogura *Pseudonaja textilis* obtained by the Fourth Archbold Expedition in Oro Province, PNG, in 1953 (McDowell 1967), and the juvenile *P. textilis* obtained by d'Alberty near Katau, Western Province, in 1876 (O'Shea et al. 2016).

Meek signed an agreement with Baron Rothschild to continue collecting before returning to Australia and New Guinea. In 1896 he attempted, but failed, to reach Woodlark Island, being forced northwest to collect in the Trobriands again, before moving back to his Nadi base camp and collecting on Fergusson Island and Goodenough Island to the west, another of the d'Entrecasteaux Group. In early 1897 Meek did finally manage to return to Woodlark, but he found himself stranded at a place called Burgees, near the main mining camps, and he was unable to persuade locals to take him on to Suloya where he had been based in 1895. Eventually, after several weeks in limbo, he returned to Fergusson Island once again before making a collecting trip to the Louisiade Archipelago to the southeast, visiting St. Aignan (now Misima), Kimita, Rossel, and Sudest Islands. From 1898 onwards he devoted his collecting talents to mainland New Guinea and the Solomon Islands.

Additional Woodlark Island specimens (Fig. 2).—Of the 13 additional Woodlark Island *T. longissimus* specimens known, five (AM R.124858, 124904; BPBM 17885–87) were collected by Gregory G. Mengden in 1987 (AM specimens) and Allen Allison in 2003 (BPBM specimens), at Guasopa (9.2258°S, 152.9478°E), approximately 22 km E of Suloga in the southeast of Woodlark Island, and a single specimen (BPBM 17888) was collected during the same year by Allison at Unapoi Homestead (9.1986°S, 152.7314°E), W of Suloga Harbour, on the southern coast. Four

[13] £1 in 1895 was worth the equivalent of £123.88 in 2017, so Meek's prospecting raised him the equivalent of almost £31,000 or \$41,200 in modern terms (values obtained at www.in2013dollars.com).

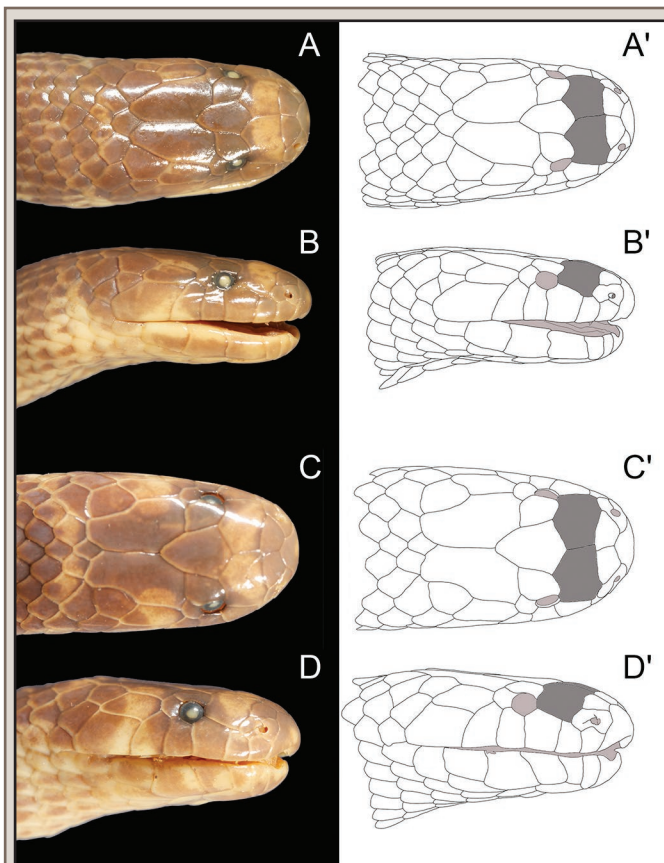


FIG. 4. Head details for two specimens of *Toxicocalamus longissimus*, each composed of a photograph and a line drawing to better illustrate pholidosis. The four upper images depict the paralectotype (BMNH 1946.1.18.92, formerly BMNH 96.7.8.17) and the four lower ones the purported Fergusson Island specimen (BMNH 1904.11.1.60). (A, A') Dorsal view of the head. (B, B') Right lateral view of the head. (C, C') Dorsal view of the head. (D, D') Right lateral view of the head. The shaded areas outline the fusion between the preocular and prefrontal scales; six supralabials are present. The lectotype (BMNH 1946.1.18.93, formerly BMNH 96.7.8.18) was examined but not included here since the skull was removed from the body, rendering the specimen unsuitable for the purpose of creating this comparative figure.

specimens (AMNH R-76619, 76629–30; BPBM 42185) were collected at Kulumadau (9.0847°S, 152.7175°E), a locality 15 km N of Suloga Harbour in the center-east of the island during the Fifth Archbold Expedition of the AMNH in 1956, and by Fred Kraus in 2011, respectively, while three specimens were taken on the north coast, one (BPBM 39702) by G. Clapp near Waimunon Bay (9.0761°S, 152.8361°E), approximately 17 km NNE of Suloga Harbour in 2010, and two (BPBM 42183–84) by Kraus at Dikoias (9.0422°S, 152.7497°E), approximately 20 km N of Suloga Harbour in 2011. One specimen (AM R.46845) does not bear any locality data.

The third Meek specimen.—In light of the preceding paragraphs, the collection locality of the remaining specimen of *T. longissimus* (BMNH 1904.11.1.60) becomes contentious because it was recorded as collected on Fergusson Island in the d'Entrecasteaux Archipelago, 190 km west of Woodlark Island. We have compared this specimen to other *T. longissimus* and it is clearly a member of that taxon (Table 1; Figs. 3D–F, 4). In common with other specimens of *T. longissimus*, and in con-

TABLE 1. Comparison of BMNH 1904.11.1.60 with *Toxicocalamus longissimus* from Woodlark Island, Milne Bay Province.

Comparison of specimens	BMNH 1904.11.1.60 ♂	<i>Toxicocalamus longissimus</i> ♂♂ N = 7, ♀♀ N = 8
Dorsals	17-17-17	17-17-17
Ventrals	273	♂♂ 244–273, ♀♀ 273–304
Cloacal plate	paired	paired
Subcaudals	47, paired	♂♂ 44–48, ♀♀ 24–32, paired
Supralabials	6(3–4)	6(3–4)
Preocular–Prefrontal	fused	fused
Internasal	separate	separate
Postocular	single	single
Anterior temporals	single	single
Posterior temporals	pair	pair
TL/TTL %	11.8%	♂♂ 10.7–12.2%, ♀♀ 5.3–7.7%

trast to all other extant and described *Toxicocalamus*^[14], BMNH 1904.11.1.60 exhibits 17–17–17 dorsal scale rows, and its ventral and subcaudal scale counts fall near the upper ends of the ranges for the other seven male specimens of *T. longissimus* (given in parentheses), which number 273 ventrals (244–273) and 47 paired subcaudals (44–48). It has a TL/TTL (tail to total length ratio) of 11.8%, within the range of other male *T. longissimus* (10.7–12.2%). In common with other *T. longissimus*, this specimen also exhibits fusion of the prefrontal and preocular scutes but not the internasal scute, a characteristic shared only with *T. misimae*, *T. mintoni*, and *T. stanleyanus*, all of which have 15–15–15 dorsal scale rows. McDowell (1969) found only two tenuous differences between the BMNH 1904.11.1.60 (♂) and the five Woodlark specimens he had available (BMNH 1946.1.18.92–93 ♀♀; AMNH R-76619 ♀, R-76629–30 ♂♂). These he recorded as: “(1) the contact of the free edge of the pregenial with the fourth infralabial in the Fergusson specimen; and (2) the partial coalescence of the pale blotch on the anterior temporal with the pale blotch on the posterior supralabials in the Fergusson Island specimen.” With a further ten specimens available to us in the Bishop Museum and the Australian Museum collections, we are better able to assess the usefulness of these differences, and it is clear that contact between the pregenial and the 4th supralabial is the norm rather than the exception, this condition being present in both Australian Museum specimens (AM R.124858, 124904) and all except one of the eight Bishop Museum specimens (BPBM 17885–88, 39702, 42183–85), although the contact varies from broad to mere point contact. There is also every de-

[14] De Vis (1905) described *Vanapina lineata* from a single specimen, purportedly collected in the Vanapa Valley, 40 km N of Port Moresby (PNG), by the Lieutenant-Governor of British New Guinea, Sir William MacGregor (1846–1919). De Vis likened this specimen to *Apistocalamus* (= *Toxicocalamus*) *loriae*, but noted that the prefrontals entered the orbit (i.e., they were fused with the preoculars) and the snake possessed 17 scale rows. These two characteristics, especially the high dorsal scale count, led Ingram (1989) to synonymize *V. lineata* with *T. longissimus*, but given the considerable distance between the Vanapa River and Woodlark Island this seems an unlikely scenario. Unfortunately, the holotype of *V. lineata*, reportedly accessioned into the Queensland Museum, is now believed to be lost, so it is impossible to make any further decisions regarding its identity. However, we are also in possession of an undescribed taxon of *Toxicocalamus* exhibiting fused preocular–prefrontal scutes and 17 dorsal scale rows that is assuredly not *T. longissimus*.

TABLE 2. Comparison of AM R.7614 with *Toxicocalamus misimae* from Misima Island, Milne Bay Province.

Comparison of specimens	AM R.7614 ♂	<i>Toxicocalamus misimae</i> ♂♂ N = 4, ♀ N = 1
Dorsals	15-15-15	15-15-15
Ventrals	229	♂♂ 201–231, ♀ 254
Cloacal plate	paired	paired
Subcaudals	42, paired	♂♂ 46–50, ♀ 29, paired
Supralabials	6(3-4)	6(3-4)
Preocular-Prefrontal	fused	fused (except SAMA R69924)
Internasal	separate	separate
Postocular	single	single or pair
Anterior temporals	single	single
Posterior temporals	pair	pair
TL/TTL %	13.5%	♂♂ 13.3–16.0%, ♀ 7.5%

gree of temporal-supralabial blotch coalescence, from blotches only faintly present on the supralabials to bold coalescence across the anterior temporal and posterior supralabials. Neither of these characters can be used to distinguish the Fergusson Island specimen from the Woodlark snakes when applied to a larger sample.

After his 1896 visit to England, Meek does not appear to have travelled home again, at least not until after publication of his autobiography/travelogue, *A Naturalist in Cannibal Land* (1914; Fig. 3B), because he does not mention such a journey. It is possible he did not return even then since he eventually retired to Australia, dying at Bondi, Sydney in 1943. The fact that he, like a great many other natural history collectors of his era, rarely accompanied his specimens home may easily have led to errors in the interpretation of his field notes, while field tags may have become detached and mixed up by the museum curators many months or years after the specimens had been collected. Since Rothschild and his collectors placed their emphasis on birds, insects, and mammals, it is quite possible that any by-catch reptiles were documented less diligently. In 1897 Meek visited both Woodlark and Fergusson Islands and it is perfectly conceivable that material considered of lesser importance may have become mixed up or incorrectly labeled whilst he stayed at his Nadi base camp.

It is worth noting that on each of the Milne Bay islands where *Toxicocalamus* has been collected, only a single species of this genus has been documented, including on Woodlark (*T. longissimus*), Misima (*T. misimae*), Rossel (*T. holopelturus*), Sudest (*T. mintoni*), Goodenough (*Toxicocalamus* sp. fide C. Austin, pers. comm.), Fergusson (*T. nigrescens*), and Normanby (*T. lorae* Clade 4 fide Strickland et al. 2016). Fergusson Island *T. nigrescens* is represented by two specimens from Basima in the east (BPBM 16544) and Oya Waka in the west (BPBM 16545) collected by P. Robert and Fred Kraus, respectively. Based on these distributions, it is unlikely that Fergusson Island is home to both a *T. lorae*-type and a *T. longissimus*-type species.

We believe that Meek's travels and the circumstances of how he consolidated his collection for shipment make it most likely that BMNH 1904.11.1.60 actually originated on Woodlark, being merely held over in his Nadi base camp prior to shipment to England, and that the inclusion of Fergusson Island in the distribution of *T. longissimus* is a consequence of a clerical error—an erroneous environment.



FIG. 5. Collection localities of *Toxicocalamus misimae* on Misima Island, Milne Bay Province, Papua New Guinea. Localities include Mararoa on Mt. Sisa (AMNH R-76684, holotype), Umuna Mine (AM R.125026), Misima Mine (SAMA R69921), Bulai Plantation (SAMA R69924), and Bagilina on Mt. Oia-Rau (BPBM 17231). Scale = 20 km.

QUESTIONABLE LOCALITY 2:

TOXICOCALAMUS MISIMAE IN THE MEKEO REGION

Types and confirmed records (Fig. 5).—The insular elapid *T. misimae* is known from only six specimens. The holotype (AMNH R-76684) was collected in 1956 at Mararoa (10.6556°S, 152.8058°E) on the north slope of Mount Sisa at the eastern end of Misima Island by Lionel John Brass (1900–1971) and Russell Francis Peterson (1922–2013), two members of the Fifth Archbold Expedition to New Guinea (March 1956–January 1957).

Four further specimens were subsequently collected on Misima, one (AM R.125026) by Gregory Mengden in 1987 at the Umuna Mine (10.6642°S, 152.8100°E) south of Mount Sisa, and one (BPBM 17231) by Fred Kraus in 2003 at Bagilina (10.6539°S, 152.6717°E) at the western end of Misima, both localities at an elevation of ca. 130 m. More recently, additional specimens were collected on Misima Island by Steve J. Richards, one (SAMA R69921) from a rainforest site near Misima Mine in central Misima Island (10.6589°S, 152.7961°E), and one (SAMA R69924)^[15] from Bulai Plantation in northern Misima Island (10.6500°S, 152.7500°E).

The Camp specimen (Fig. 6E).—The sixth specimen of *T. misimae* (AM R.7614) is recorded as having been collected in the Mekeo region of Central Province (Fig. 1). It agrees fairly well with the four other known male *T. misimae* (values in parentheses; Table 2, Fig. 7) by exhibiting a dorsal scale count of 15-15-15, a ventral count of 229 (201–231), a slightly lower subcaudal count at 42 (46–50) that is still much greater than found in the single known female specimen (29), fused preocular-prefrontal scutes, and a TL/TTL ratio of 13.5% (13.3–16.0%).

The collector was Charles W. Camp (1873–1955; Fig. 6A), Curator of Birds at the Taronga Park Zoo, Sydney, and the specimen formed part of a small collection of reptiles (Table 3) donated to the Australian Museum following Camp's 1921 expedition to the Mekeo region to collect live birds for the Zoo. The Mekeo region is located approximately 96 km NW of Port Moresby, PNG (estimated GPS coordinates are given as 9.000°S and 146.833°E for Camp's specimen in the online database VertNet). This is a low-lying swampy area (elevation < 20 m), unlike the habitat with which *Toxicocalamus* species are usually associated, although a single specimen of *T. stanleyanus* (ZSM 52/2000) was purportedly collected in the Maeaera Plantation

[15] This specimen (SAMA 69924) does not exhibit fused preocular-prefrontal scales and therefore raises additional questions as to its identification.

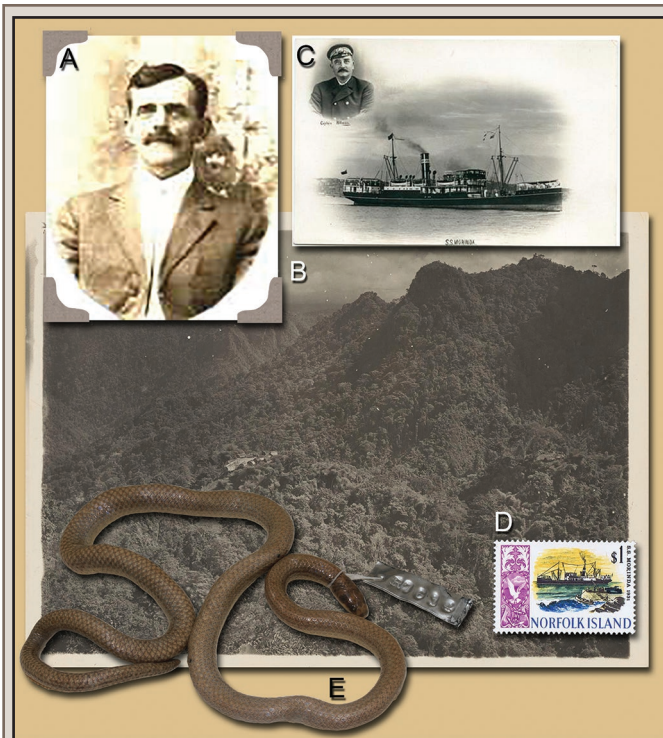


FIG. 6. Photomontage of images illustrating Charles W. Camp's bird-collecting expedition (1921). A) Charles W. Camp (1873–1955), Curator of Birds at the Taronga Park Zoo, Sydney, Australia. B) Mount Davidson, in the Mekeo region of Central Province, Papua New Guinea, Camp's destination inland from Yule Island (photo by Frank Hurley, ca. 1923). C) Postcard featuring the SS *Morinda* and its master, Captain Edward James Hillman. D) Norfolk Island \$1 postage stamp, illustrating the SS *Morinda* in 1931. E) The specimen of *Toxicocalamus misimae* (AM R.7614) with questionable provenance.

TABLE 3. Reptile specimens donated to the Australian Museum by C. W. Camp. Specimens are listed using currently valid taxon names.

Specimen number	Species
R.7611–12	<i>Demansia vestigiata</i>
R.7613	<i>Laticauda colubrina</i>
R.7614	<i>Toxicocalamus misimae</i>
R.7615	<i>Hemidactylus frenatus</i>
R.7616	<i>Emoia atrocostata</i>
R.7617–18	<i>Cryptoblepharus litoralis</i>

(elevation 10 m) on the Angabanga (formerly St. Joseph) River, close to Yule Island and the coast.

Camp hoped to collect live birds on the slopes of Mt. Davidson (Fig. 6B) in the Owen Stanley Range further inland. Fourteen other specimens of *Toxicocalamus* have been collected at higher elevations within this mountain range between Tapini (elevation 880 m) and Mafulu (elevation 1270 m), but all represent either *Toxicocalamus loriae* (N = 5, including the synonym *Apistocalamus pratti*), or *T. stanleyanus* (N = 9), two species that are easily distinguishable from *T. misimae*.

Camp's small collection of reptiles (Table 3) included three other snakes: two whipsnakes, *Demansia vestigiata*, a species that occurs along the southern coast of the Papuan Peninsula, and a sea krait, *Laticauda colubrina*, a species common through

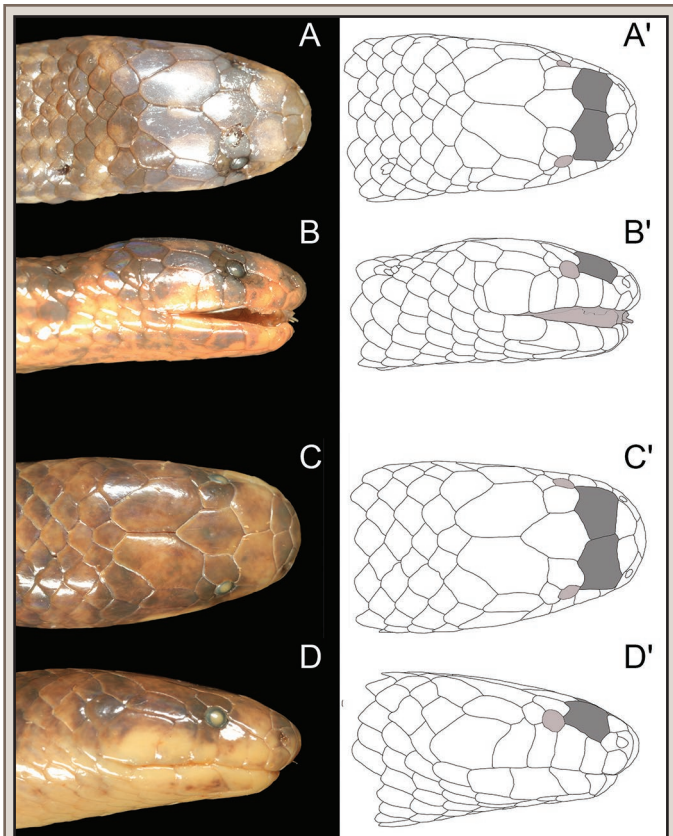


FIG. 7. Head details for two specimens of *Toxicocalamus misimae*, each composed of a photograph and a line drawing to better illustrate pholidosis. The upper four images depict the holotype (AMNH R-76684) and the lower two the putative specimen from the Mekeo region (AM R.7614). (A, A') Dorsal view of the head. (B, B') Right lateral view of the head. (C, C') Dorsal view of the head. (D, D') Right lateral view of the head. The shaded areas outline the fusion of preocular and prefrontal scales; six supralabials are present.

northern New Guinea and the Bismarck Archipelago, whereas the sea krait of the southern Papuan coast is now recognized as a distinctly different species, *L. guineai*, Heatwole et al. 2005. Camp's specimen is a *L. colubrina* (Glenn Shea, pers. comm.). There were four lizards in the collection, one gecko and three skinks. The common house gecko (*Hemidactylus frenatus*) is a perianthropic species widely distributed throughout the Asia-Pacific Region, and its presence in a collection is not helpful when trying to determine the origin of the collection. Two snake-eyed skinks (*Cryptoblepharus*) are members of the pale species *C. litoralis* from Port Moresby and not the strongly striped *C. yulensis* from Yule Island or the similarly patterned *C. richardi* from Misima Island. What Camp identified as "scincid sp." is a juvenile specimen of the mangrove-dwelling *Emoia atrocostata* (Glenn Shea, pers. comm.). In this set of specimens, *T. misimae* alone is not a species readily associated with the Papuan Peninsula. In this series of specimens *T. misimae* and *L. colubrina* are not species associated with the southern Papuan Peninsula.

Voyages of SS Morinda.—Just as in the case of *T. longissimus* and Woodlark Island, there are reasons to propose that the wayward specimen of *T. misimae* originated on Misima. Camp collected approximately 300 birds, including forty birds-of-paradise (Paradisaeidae), during his expedition to the Mekeo region. He and his guide, an Australian gold prospector named Swanson, travelled from their base on Yule Island to the New

A



D

The current contract provides for Papua, a through mail service of one sailing every calendar month by s.s. *Morinda* (1,000 tons gross), with the following itinerary:—Sydney, Brisbane, Cairns, Port Moresby, Bootless Inlet, Samarai, and return by the same ports, calling at Yule Island on alternate trips and at Woodlark Island on each quarter, with the right to call at Milne Bay and/or Misima when approved by the Minister.

The amount of subsidy paid in respect of this service is £12,000 per annum.

C

LOUISIADÉ ARCHIPELAGO.

MINING ON MISIMA ISLAND.

TRIP TO THE SOUTH SEAS.

Messrs. Gordon Lyon and J. Brandon, of Melbourne, representing certain mining syndicates, returned to Brisbane on Monday by Messrs. Burns, Philp, and Co.'s steamer *Morinda*, having made a visit to the Solomon Islands and the Louisiade Archipelago. They left Sydney in July in Messrs. Burns, Philp, and Co.'s steamship *Matunga*, which had on board a large number of tourists. The vessel diverted from the usual track followed to Papua, and after leaving Brisbane proceeded to the Solomon Islands, where the passengers had a view of the coconut plantations, with which they were very much impressed. The voyages both north and south were very enjoyable. Mr. Brandon said that Captain M'Innes, of the *Morinda*, did everything they could to make the trips interesting and informative to tourists.

The *Matunga* steamed over to Misima Island, in the Louisiade Archipelago, a group of islands 20 miles east-south-east of Samarai, Papua, where Messrs. Gordon Lyon and Brandon were disembarked, and the vessel resumed the voyage to Rabaul. Arrangements were made for the *Morinda* to call for them on the way from Rabaul. They both represented syndicates interested in Block 10 and St. Aignan Gold Option and Massive Gold Option on the island. Their mission was to visit the properties, which they said, fully warranted considerable further development, although at present nothing definite had been proved. Two highly qualified competent mining engineers were now on the properties, but a considerable amount of capital would be necessary to determine the true value of the fields. The island is mountainous, and the mines are situated about five miles from the beach, at an altitude of 600ft. and 1000ft. above sea level. The journey had to be made on foot, and the two visitors had rather an unpleasant experience on the return trip, as they reached the beach three days before the *Morinda*, which was delayed, arrived to take them on board. They camped on the beach, living on tinned meat and fish.

E

PROJECTED DEPARTURES.—Aug. 17.

Cian Stuart, s, for Dunkirk and Antwerp, via ports; *Morinda*, s, for Port Moresby, Yule Island, Samarai, and Rabaul; *Makambo*, s, for Lord Howe and Norfolk Islands, Vila, and New Hebrides; *Draft*, s, for Tchibou, via Port Kembla and Noumea; *Pulganbar*, s, for Byron Bay; *Hunter*, s, for Newcastle; *Erina*, s, for Gosford and Woy Woy.

1dw ed to a	Canberra, s, for Queensland ports; Induna, s, for Newcastle; Kaituna, s, for Melbourne.	south. PORT Aug. 3.10 SKAL p.m., Co PORT s. 4.45 p.m. NEWCA son, s, Co Archer, s Induna, s Werribee, from the
day.	PROJECTED DEPARTURES.—Sept. 28.	
ord., 35/10/6, s 7/6; 9/8, s s 30/6.	<i>Morinda</i> , s, for Port Moresby, Yule Island, Samarai, and Misima; <i>Kaituna</i> , s, for Newcastle; <i>Duranbah</i> , s, for the Tweed River; <i>Macquarie</i> , s, for Port Macquarie, Hastings, and Wilson River; <i>Jap</i> , s, for Camden Haven; <i>Hunter</i> , s, for Newcastle; <i>Erina</i> , s, for Gosford and Woy Woy.	
	STEAMERS DUE TO-DAY.	
	<i>Demosthenes</i> , from Brisbane, via Newcastle (Dal-	

n Ambu- James's Chief Jus- community abundance, s never ; at least and wonder Seldom vol some	Shipping, s, for Queensland ports; Rokiri, s, for Newcastle; Goulburn, s, for Newcastle.	HOBART a.m., from
	PROJECTED DEPARTURES.—Nov. 9.	
	<i>Morinda</i> , s, for Port Moresby, Yule Island, Samarai, and Misima; <i>Poonbar</i> , s, for Queensland ports; <i>Ara- hura</i> , s, for Melbourne; <i>Duranbah</i> , s, for Tweed River; <i>Hunter</i> , s, for Newcastle; <i>Erina</i> , s, for Gos- ford and Woy Woy.	At Flt left 59
	STEAMER DUE TO-DAY.	For S For B For W
	<i>Melusia</i> , from Rabaul (Federal Wharf).	The f
	CLEARANCES.—Nov. 8	

B

THE SYDNEY MORNING HERALD, TUESDAY, SEPTEMBER 20, 1921.

NEW ZOO BIRDS.

CAUGHT IN PAPUA.

COLLECTOR'S HARDSHIPS.

The *Morinda* brought in from Papua the head keeper of Taronga Park (Mr. C. W. Camp) and about three hundred valuable young birds from the New Guinea mountains. There are about forty birds of paradise, including one gorgeous "sixpenny," and numbers of rifle-birds and rare doves and pigeons. The paradise birds are mostly very young, and the males will not show any brilliant plumage for some time. The bright feathers appear on the cock birds from four years of age onwards.

It has been no light task to collect these 300 birds, and few of those who may go to see them would guess the trials and hardships which Mr. Camp has had to overcome. He had with him an Australian prospector named Swansen, who spends his life looking for gold in Papua, and these two men, picking up native carriers as they could, tramped 60 miles into the Papuan scrub and half-way up Mount Davidson, the chosen hunting-ground. It was rough going up and down the faces of precipitous hills. Natives could be induced to carry only from village to village, for the men of one village would not carry past the next one. Mr. Camp was sick with malaria before he left Yule Island (his starting point), and after the four or five days' tramp to the village of Laifa, on the slopes of Mount Davidson, he had to be put to bed in a native hut. He pays grateful tribute to Swansen for nursing him there for most of a month—he was lucky that black-water fever did not develop—and for his management of the native villagers, who caught the birds and eventually carried them down to the plains for him.

The natives caught the birds with their own simple snare—a piece of fishing line, looped with a running knot and laid on a branch of a tree which the birds habitually used. They would go out in the afternoon, each with simply his length of fishing line, would climb the trees (already observed to be favoured by the birds), and place their running knots in position on the boughs. Then they would be in wait at the foot of the trees all night, or two nights if necessary. The price each bird brought in was a stick of tobacco. Some of the smaller birds—the starlings for instance—were caught in nets.

The sick-bed in a native hut was not made the pleasant by shortage of decent food. Mr. Camp lost two stone in weight, and could ill afford it. The two Australians had mostly rice and tinned meat—the local sweet potatoes were not attractive. The country therabouts is not naturally rich in native food or fruit, and the birds suffered, too, on the way down, for no ripe bananas could be found for them. Mr. Camp had to pound up green bananas softened in the fire, but the birds did not like them, and were nearly starving when they reached the plains. Carriers were hard to get, owing also largely to the lack of food, and only the willing assistance of the mountain village where he stayed—men, women, and children turned out to help him—enabled Mr. Camp to get his birds to the plains.

Once at Yule Island again, Mr. Camp could obtain all he wanted for the birds—bananas, paw-paws, eggs, and cake. The Assistant Resident Magistrate's cook made him a cake, "with six eggs in it." Birds of paradise seem to have a special liking for cake.

Several of the three hundred died at sea on the way to Australia. The voyage was long, for they had to travel with the ship up to Rabaul and then back again.

FIG. 8. Newspaper clippings and other information expounding the issue of Charles W. Camp's collecting. A) Portrait of the SS *Morinda* by Australian maritime artist Reginald Arthur Henry Borstel (1875–1922). B) *The Sydney Morning Herald*, 20 September 1921 (page 8) with the headline "New Zoo Birds • Caught in Papua • Collector's Hardships." C) *The Brisbane Courier*, 25 August 1915 (page 4) with the headline "Louisiade Archipelago • Mining on Misima Island • Trip to the South Seas." D) Joint Committee of Public Accounts Report on Pacific Islands Shipping Facilities 1927 (page 6). E) Three schedules for SS *Morinda* sailings during 1921 from *The Sydney Morning Herald*, for 17 August, 28 September, and 9 November, itemizing Port Moresby and Yule, Samarai, and Misima islands.



FIG. 9. Map of the route of the SS *Morinda*, which is known to have called, in order, at Yule Island, Port Moresby, Bootless Bay, Samarai Island, Lae, Madang, and Rabaul before turning south for Australia. The stippled line shows a likely direct route from Rabaul to Australia, illustrating that Misima Island, with its important economy, lay directly on the route of travel.

Guinea mainland and the slopes of Mount Davidson and later retreated back to Yule Island. During this journey, Camp spent a great deal of his time sick, while villagers collected birds for him. Having returned to Yule Island, Camp arranged transportation for himself and his bird collection to Sydney aboard the SS *Morinda* (Figs. 6C, 8A), a vessel of the Burns Philp shipping line. *The Sydney Morning Herald* of 20 September 1921 (page 8; Fig. 8B) announced the arrival of Camp and his bird collection in Sydney, with the header “New Zoo Birds – Caught in Papua – Collector’s Hardships,” in which it is reported that the journey was long, that Camp fell ill, and that some of the birds died in transit. Whilst the outbound route to Port Moresby was relatively short, the homeward bound journey was considerably longer, as the vessel serviced other coastal settlements in Papua and New Guinea^[16]. From Port Moresby, or sometimes from Yule Island,

the SS *Morinda* would make stops at Bootless Bay just east of Port Moresby, Samarai Island at the southeastern tip of mainland Milne Bay, then Lae and Madang on the northeast coast of New Guinea, followed by Rabaul at the eastern end of New Britain, before turning south for Australia. Misima Island is located approximately 200 km east of Samarai but lies almost directly on a course plotted south from Rabaul to Cairns, Brisbane, and eventually Sydney (Fig. 9). Thus, there were excellent possibilities that the SS *Morinda* would call at Misima on the homeward bound leg of the journey.

Alluvial gold had been discovered on Misima in 1888, and a gold and copper mine was established in 1915 (Shannon and Stoker 2013) that produced around 100 tons of ore each day until its closure in 1942. *The Brisbane Courier* of 25 August 1915 (Fig. 8C) detailed how two mining company representatives, Messrs. Gordon Lyon and J. Brandon, visited Misima to assess the possibilities of mining. These gentlemen traveled back to Brisbane aboard the SS *Morinda*, which called at Misima en route from Rabaul to Australia. When mining began in earnest, it might be expected that Burns Philp vessels would have visited Misima on a more regular basis. Indeed, the 1927 Joint Committee of

[16] During the early decades of the 20th Century until 1949, Papua (formerly British New Guinea) and New Guinea (formerly German New Guinea) were administered separately by the Australian administration. In 1949 the two territories were merged as Papua and New Guinea, becoming Papua New Guinea at Independence in 1975.

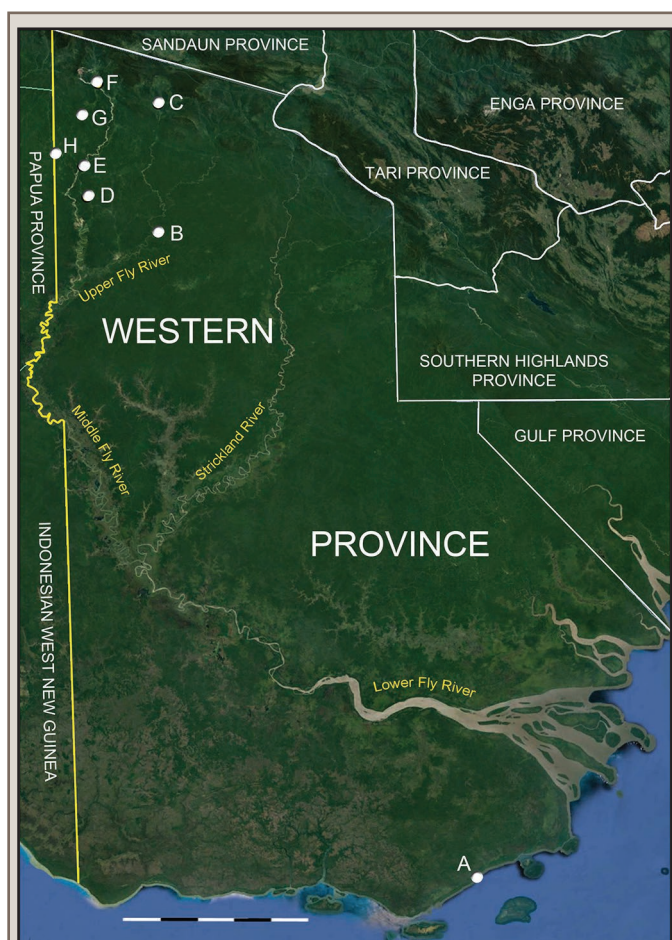


FIG. 10. Collecting localities of *Toxicocalamus* populations in Western Province, Papua New Guinea. Localities include: A – Katau, Binaturi River (*T. preussi angusticinctus*, MSNG 54100); B – 8 km S Palmer Junction, Fly River (*T. p. angusticinctus*, AMNH R-57511–12, holotype and paratype); C – Olsobip, Fly River (*T. p. angusticinctus*, PNGM 24584, UPNG 1613); D – Matkomrae, Ok Tedi (*T. p. angusticinctus*, MCZ R-121551, 141008, and *T. stanleyanus*, MCZ R-121550); E – Ningerum, Ok Tedi (*T. p. angusticinctus*, MCZ R-140753, 140989, 141007, USNM 217500, and *T. stanleyanus*, MCZ R-140988, PNGM 22159); F – Tabubil, Ok Tedi (*T. p. angusticinctus*, AM R.127468, UPNG 5665); G – Derongo (*T. stanleyanus*, CAS 121220); and H – Ingembit, Ok Walimkan (*T. stanleyanus*, MZB 1464). Scale = 100 km.

Public Accounts Report on Pacific Islands Shipping Facilities (page 6; Fig. 8D) reported that:

“THE CURRENT CONTRACT PROVIDES FOR PAPUA A THROUGH MAIL SERVICE OF ONE SAILING EVERY CALENDAR MONTH BY THE S.S. *MORINDA* (1,500 TONS GROSS), WITH THE FOLLOWING ITINERARY: SYDNEY, BRISBANE, CAIRNS, PORT MORESBY, BOOTLESS INSET, SAMARAI, AND RETURN BY THE SAME PORTS, CALLING AT YULE ISLAND ON ALTERNATE TRIPS AND AT WOODLARK ISLAND EACH QUARTER, WITH THE RIGHT TO CALL AT MILNE BAY AND/OR MISIMA WHEN APPROVED BY THE MINISTER. THE AMOUNT OF SUBSIDY PAID IN RESPECT OF THIS SERVICE IS £12,000 PER ANNUM.”

Although we have not been able to locate the specific itinerary for the SS *Morinda* on the voyage that included Camp's return to Sydney on 20 September 1921, *The Sydney Morning Herald* for 28 September and 9 November 1921 (Fig. 8E) listed the projected ports of call for this vessel as Port Moresby, Yule Island, Samarai,

and Misima. It appears likely that the mining operations turned Misima into a regular stop on the return leg of the SS *Morinda* en route to Australia, and if, as it appears, the vessel carrying Camp and his birds did make a stop at Misima, then this island would be the much more likely origin of AM R.7614. The Mekeo region origin that was previously accepted is another erroneous environment.

QUESTIONABLE LOCALITY 3:

TOXICOCALAMUS PREUSII ANGUSTICINCTUS IN THE SOUTHERN FLY

Types and confirmed records.—The subspecies *Toxicocalamus preussi angusticinctus* was described by Bogert and Matalas (1945) based on a holotype (AMNH R-57512) and paratype (AMNH R-57511) collected during the Second Archbold Expedition at their Palmer Junction Camp (6.0058°S, 141.4994°E), ca. 8 km S of the confluence of the Fly and Palmer Rivers^[17] (Fig. 10). Currently 11 further specimens are known from the Upper Fly River at Olsobip (5.3889°S, 141.5167°E; PNGM 24584, UPNG 1613), the Ok Tedi^[18] (= Alice River) at Ningerum (5.6733°S, 141.1422°E; MCZ 140753, 140989, 141007, PNGM 22159, USNM 217500), and Tabubil (5.2769°S, 141.2269°E; AM R.127468, UPNG 5665), and the Ok Mart at Matkomrae (5.8244°S, 141.1592°E; MCZ 121551, 141008), all in the North Fly District of Western Province, PNG, on the southern versant of the Central Cordillera^[19].

Toxicocalamus preussi can be distinguished from all its congeners by its dorsal scale count of 13–13–13, which is unique in the genus; all other species have 15–15–15 dorsals, with the exception of *T. longissimus* (17–17–17). The subspecies is easily distinguishable from the nominate form, the north coast *T. p. preussi*, by a suite of eidonomic characteristics (those of the nominate subspecies in parentheses): 5th supralabial in contact with the postocular (separated by the 4th supralabial); ventrals ♂♂ 305–339 (280–304), ♀♀ 345–359 (291–331); subcaudals ♂♂ 38–45 (39–54), ♀♀ 26–30 (16–25). Bogert and Matalas (1945) also set great store in the differences between the broad nuchal bands in the four *T. p. preussi* from SW Bernard Camp, Taritatu (= Idenberg) River, West New Guinea (WNG), they examined (3.5131°S, 139.1611°E; AMNH R-62469–72), and the narrow W-shaped bands of their holotype and paratype of *T. p. angusticinctus*, but with more specimens now available from the North Fly this characteristic, which the authors unfortunately used in their subspecific epithet, is unreliable for the purposes of identification.

The D'Albertis specimen.—The Italian naturalist-explorer Luigi Maria D'Albertis (1841–1901; Fig. 11A) conducted three expeditions to Western Province, PNG, the purpose of which was to navigate the Fly River as far north as possible, his ultimate

[17] This locality is based on the position of the Palmer Junction Camp as indicated on the map in Rand and Brass (1940).

[18] Ok = river, in the local Wopkaimin language (Keig 2001), the river is therefore known as the Ok Tedi, not the Ok Tedi River.

[19] Another southern versant population of *T. preussi* is found in Southern Highlands Province around Mount Sisa and Mount Bosavi and the Hegegio River, in Gulf Province, on the Kikori and Purari Rivers, and in Simbu Province around Crater Mountain. The characteristics of these specimens are intermediate between those of *T. p. preussi* on the north coast and *T. p. angusticinctus* on the North Fly. They are not discussed further here as D'Albertis did not collect in these areas and MSNG 54100 could not have originated from these populations.

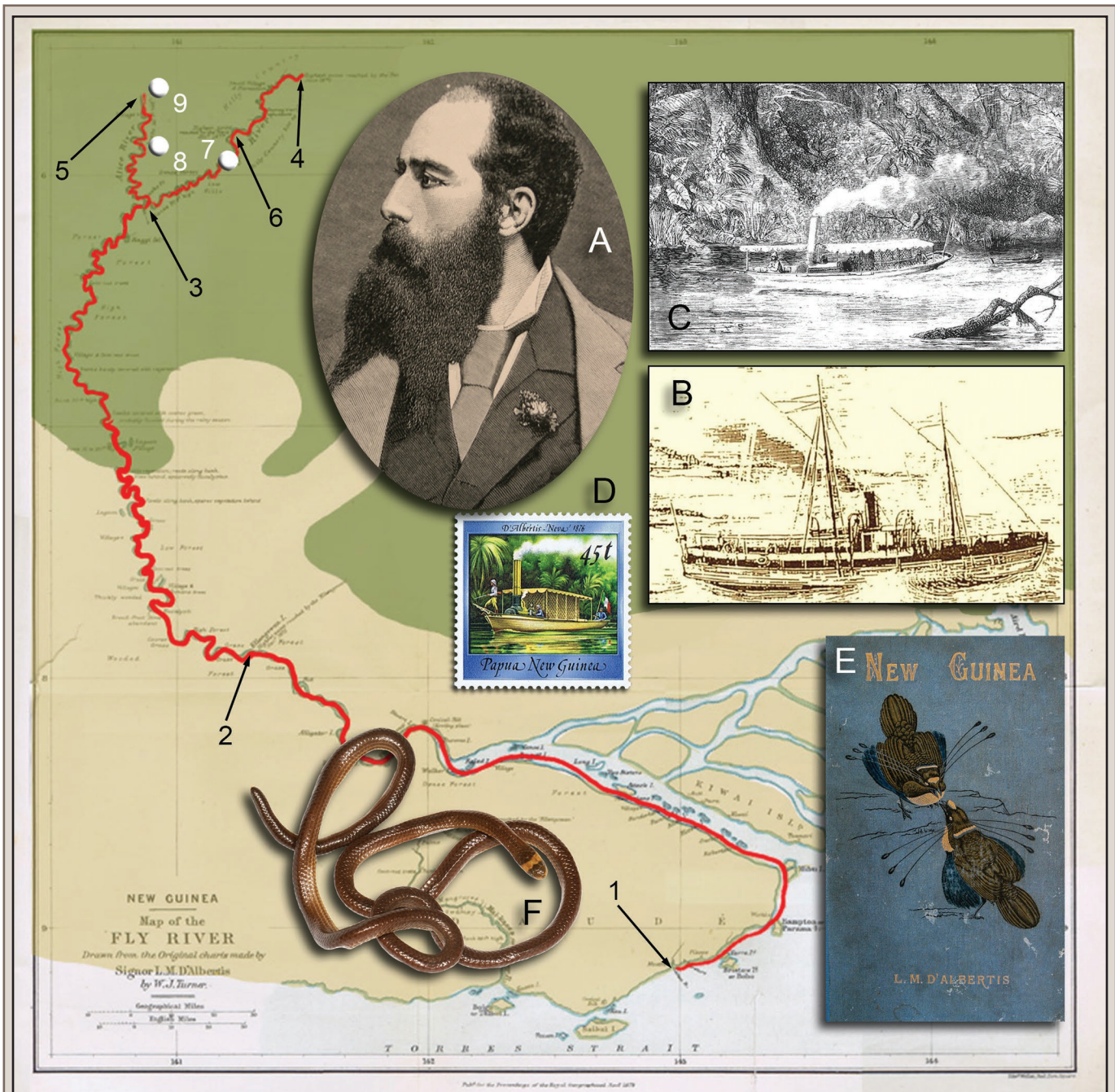


FIG. 11. Collage of illustrations documenting Luigi Maria d'Alberis's journeys on the Fly River (1875–77). The background map depicts the Fly River and surrounds, primarily located in Western Province, Papua New Guinea. The original map was compiled by William John Turner, Map Curator to the Royal Geographical Society, drawn from the original charts by L. M. d'Alberis to accompany D'Alberis's paper in the Proceedings of the Royal Geographical Society in September 1879. We have color-coded savanna woodland in light brown and rainforest in green. D'Alberis's routes are indicated in red. A) Italian naturalist-explorer Luigi Maria d'Alberis, from a portrait in the Museo della Cultura del Mondo di Genova in Genoa, Italy. B) An artist's impression of the Reverend Samuel MacFarlane's missionary vessel, the SS *Ellengowan*, on which D'Alberis made his first ascent of the Fly River (artist unknown). C) An artist's impression of D'Alberis's shallow-draft vessel, the *Neva*, on board which he made his second and third ascents of the Fly River. The illustration is reproduced from the second book of D'Alberis's two-volume report *New Guinea: What I did and What I Saw*, published in 1880, facing page 46. D) 1987 Papua New Guinea 45t postage stamp illustrating D'Alberis standing in the prow of the *Neva*, shotgun cocked. This stamp is from a 15-stamp issue commemorating famous exploratory ships in Papuan waters. E) The cover of D'Alberis's volumes. F) D'Alberis's specimen of *Toxicocalamus preussi angusticinctus* (MSNG 54100), presented with a problematic locality. Numbers are used to indicate localities relevant to the discussion of D'Alberis's travels and include 1 – Katau, or the mouth of the Binaturi River. This is the locality where MSNG 54100 was purportedly collected; 2 – Ellengowan Island, the highest point reached on D'Alberis's first Fly River expedition (1875); 3 – Snake Junction (now D'Alberis Junction) on the confluence of the Alice River (now Ok Tedi) with the Fly River; 4 – The furthest point on the Fly River reached by D'Alberis's second expedition (1876); 5 – The furthest point on the Alice River (Ok Tedi) reached on the second expedition (1876); 6 – The furthest point reached along the Fly River on the third expedition (1877); 7 – 8 km S Palmer Junction, on the Fly River (type locality of *T. preussi angusticinctus*); 8 – Matkomrae, Ok Tedi (locality for *T. p. angusticinctus* and *T. stanleyanus*); 9 – Ningerum, Ok Tedi (locality for *T. p. angusticinctus* and *T. stanleyanus*).

aim being to reach the mountains of the Central Cordillera. D'Albertis collected a single specimen of *Toxicocalamus* (Fig. 11F) that can be identified as *T. p. angusticinctus* by the following characteristics: 13–13–13 dorsal scale rows; fused preocular-prefrontal-internasal scutes, cloacal plate entire; and

5th supralabial in broad contact with the single postocular (Fig. 12). This specimen (MSNG 54100), a male, compares favorably with the six other male *T. p. angusticinctus* collected in the North Fly of Western Province (values given in parentheses; Table 4) by exhibiting a slightly lower ventral count of 305 (311–339), a slightly greater subcaudal count of 45 (38–43), and a fractionally higher TL/TTL ratio of 10.1% (8.8–9.8%). It was reported to have come from Katau, which D'Albertis also spelled as Kataw and Kattau, in Western Province, PNG.

As a naturalist, D'Albertis accumulated large and diverse collections, but his primary interests were ornithology, entomology, and ethnology, to which end he made extensive collections of birds, insects, and both human remains and anthropological artifacts. D'Albertis also collected reptiles, but his record-keeping for these may not have been as precise and rigorous as the notes he kept relating to his three primary interests.

The locality “Katau” (Fig. 11.1) is not a settlement but a river mouth, today called the Binaturi River (9.1419°S, 142.9533°E), which flows off the Oriomo Plateau into the Torres Strait. D'Albertis visited the location on five occasions to obtain supplies and hire guides from the nearby village of Moatta (= Mawatta) for his three expeditions up the Fly River in 1875, 1876, and 1877. Many of D'Albertis's reptile specimens are listed as having originated at Katau, including a juvenile of the elapid *Pseudonaja textilis*, which likely came from Matzingare (= Masingara) in the eucalypt savannas to the north^[20] rather than the coastal mangrove and monsoon forest at Moatta and Katau (O'Shea et al. 2016). D'Albertis obtained a large number of reptiles from Masingara villagers during a lengthy stay at Katau (7 August–3 November 1876) following his second ascent of the Fly River. Katau, in the South Fly, is also at least 400 km S of Palmer Junction Camp, the nearest Western Province *Toxicocalamus* collection locality, where the Second Archbold Expedition obtained the aforementioned holotype and paratype of *T. p. angusticinctus*. The *kiap*^[21] and herpetologist Fred Parker

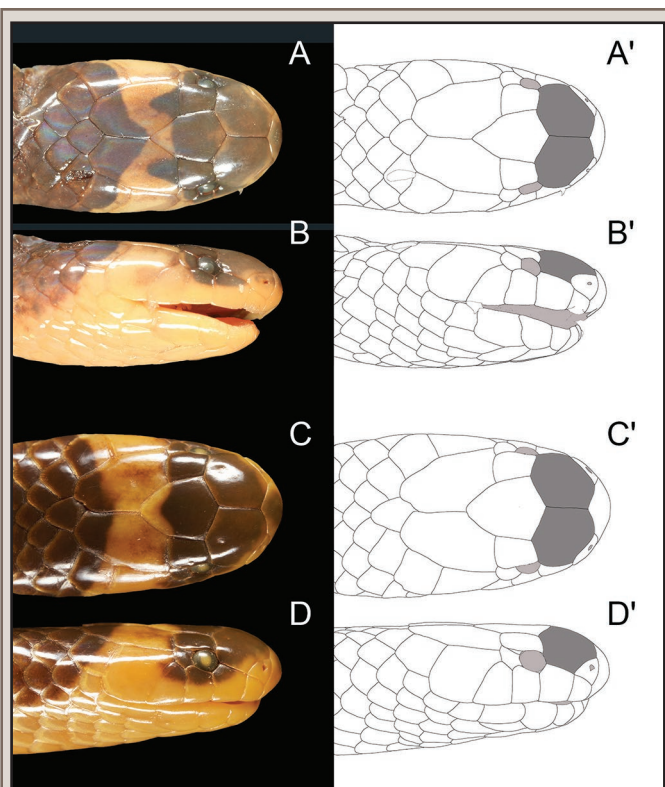


FIG. 12. Head details for two specimens of *Toxicocalamus preussi angusticinctus*, each composed of a photograph and a line drawing to better illustrate pholidosis. The upper four images depict the holotype (AMNH R-57512), whereas the lower four depict specimen purportedly collected at Katau. (A, A') Dorsal view of the head. (B, B') Right lateral view of the head. (C, C') Dorsal view of the head. (D, D') Right lateral view of the head. The shaded areas outline the fusion of preocular, prefrontal, and internasal scales; five supralabials are present, and the 5th supralabial is fused with the anterior temporal and in contact with the postocular (in *T. p. preussi* the 5th supralabial is blocked from contact with the postocular by an enlarged 4th supralabial, which contacts the parietal).

[20] D'Albertis claimed Matzingare was 10 miles (16 km) N of Moatta (D'Albertis 1880), although it seems unlikely he ever visited the village. Today Masingara is only 1 km N of Mawatta.

[21] *Kiap* is a Tok Pisin word, derived *Kapitän* (German for captain), which was used to describe pre-independence Government Patrol Officers in New Guinea, who were usually Australians.

TABLE 4. Comparison of MSNG 54100 with *Toxicocalamus preussi angusticinctus* from the North Fly Region, Western Province.

Comparison of specimens	MSNG 54100 ♂	<i>Toxicocalamus preussi angusticinctus</i> ♂♂ N = 6, ♀♀ N = 5
Dorsals	13-13-13	13-13-13
Ventrals	305	♂♂ 311–339, ♀♀ 345–359
Cloacal plate	single	single
Subcaudals	45, paired	♂♂ 38–43, ♀♀ 28–30, paired
Supralabials	5(2-3)	5(2-3)
Preocular-Prefrontal-Internasal	fused	fused except PNGM 22159, fused Prefrontal-Preocular only
Postocular	single	single
Anterior temporals	absent	absent
Posterior temporals	single	single, except PNGM 22159, pair
TL/TTL %	10.1%	♂♂ 8.8–9.8%, ♀♀ 3.5–7.0%

spent five years (1968–1973) patrolling Western Province out of Daru Island, less than 30 km E of the Binaturi River. With the help of villagers, he made extensive collections of reptiles that culminated in his book *Snakes of Western Province* (Parker 1982). The Bishop Museum, Honolulu, Hawaii, herpetologist Allen Allison also conducted herpetofaunal surveys of the Trans-Fly region (Allison 2006), and in 1986 one of us (MOS) spent two months engaged in intensive herpetofaunal fieldwork in the southern Trans-Fly, including almost one month based around the Binaturi River, returning for shorter visits in 2000 and 2006. Other herpetologists have made long or short excursions to the southern coast of Western Province, yet no further specimens of *Toxicocalamus* have been uncovered. Given that this genus is rarely found at low elevations on mainland New Guinea, where it is more an inhabitant of montane forests or deforested gardens, it seems likely that this specimen did not originate at Katau but was collected by D'Albertis on one of his forays up the Fly River.

D'Albertis's 1st Fly River Expedition.—D'Albertis accompanied the Reverend Samuel Macfarlane (1837–1911) on his first venture up the Fly River aboard the London Missionary Society (LMS) schooner, the SS *Ellengowan* (Fig. 11B), with which the missionary hoped to reach and convert the people of the interior. The expedition entered the Fly River on 6 December 1875 and continued upstream for eight days to reach its highest point, an island the expedition named Ellengowan Island^[22] (Fig. 11.2), approximately 240 km upstream on the Middle Fly. It is no more likely that the *Toxicocalamus* was collected on this expedition than having it originate at Katau, given that the general habitat and elevation are quite similar.

D'Albertis's 2nd Fly River Expedition.—When D'Albertis returned to the Fly in 1876 he was in command of his own vessel, a 15.8 m, nine-ton Australian steam launch, with a draft of 1.2 m, which he renamed the *Neva* (Fig. 11C, D). On board, apart from D'Albertis, were a multinational crew of ten, three Papuan guides, D'Albertis' dog Dash, who would succumb to snakebite towards the end of the expedition, and a sheep, which suffered a more obvious and earlier fate. The *Neva* was a crowded and heavily-laden vessel. Nevertheless, D'Albertis entered the Fly River on 23 May 1876 and managed to captain the *Neva* over 930 km upstream until on 25 June he reached a point on the Palmer River (Fig. 11.4), later known as Thompson Junction^[23] (Austen 1925, 1926), where the river became too shallow for continued exploration, even for a shallow draft vessel like the *Neva*. D'Albertis then spent several days collecting biological specimens in the forests of the Palmer River (which he thought was a channel of the Fly). He almost certainly collected reptiles during this time but his attention, and the narration of these days in his journal (D'Albertis 1880), are much more given over to the birds and insects he encountered. In the second volume of *New Guinea: What I Did and What I Saw* (1880; Fig. 11E), he mentioned only three snakes from the entire second exploration of the Fly River. Whilst fishing with rod and line on 6 June he captured a filesnake (*Acrochordus*) of which he wrote (D'Albertis 1880:71):

“It is of a beautiful dark olive colour, marked on the back with black and on the belly with yellow. It has not scales, like other serpents, but, as it were, tubercles terminating in a point, with give the skin the appearance of shagreen. I remember seeing similar dried skins in use among the natives of Moatta; they use them to polish their arrows, in the same way that our carpenters employ the skins of certain fishes. The head of this serpent resembles that of the bull-dog (*cher-sydrus?*)”

On 11 June, at the confluence of the Fly and a river D'Albertis would name the Alice River^[24] (= Ok Tedi), a junction he would afterwards refer to as Snake Point^[25] (Fig. 11.3), the Chinese cook sighted a python, which D'Albertis captured. He wrote (D'Albertis 1880:78):

“The Chinese cook caught sight of a fine serpent, sleeping at the foot of a big tree, and I easily captured it, for it made no attempt to escape. It belonged to the *Python* family, and strongly resembles *Liasis amethystinus*, but I believe it to be of another species. It differs from the before-named kind in the extraordinary size of its eyes, and in its colouring a metallic blue is remarkable^[26]. [...] I will keep it alive on board, as it seems good-tempered, for I held it closely in my hands for half an hour, and it made no attempt to bite me. My people are greatly afraid of serpents, and the mere knowledge that I am keeping it alive among my possessions will prevent them from taking tobacco or other things, which they might otherwise wish to appropriate without leave. The python is seven feet long [2.13 m] and quite a young one.”

And at the furthest point up the Palmer River, on 25 June, D'Albertis collected a death adder (*Acanthophis*). He wrote (D'Albertis 1880:106):

“We started at nine, after I had preserved in spirits of wine a most venomous serpent of the Australian *Achantophis* [sic] family. It is doubtful if it is the same species that is found in Australia, viz., *Achantophis antarctica*, or the Death Adder.”

Having given up attempting to ascend the Palmer River, D'Albertis and the *Neva* returned to Snake Point on 30 June and explored the Alice River until they encountered impassable rapids on 6 July (Fig. 11.5). On 7 July they again turned south and anchored for the evening 16 km S of Snake Point before continuing their homeward journey in the following days. D'Albertis and the *Neva* had spent almost a month in habitats conducive to the elapid genus *Toxicocalamus* and it is possible that he collected MSNG 54100 during this time, even if he did not consider the specimen remarkable enough to comment upon in his journal.

[22] Ellengowan Island is marked on the Territory of Papua and New Guinea 1:100,000 Sheet 7282, which encompasses the Middle Fly River. However, the map is titled ELLANGOWAN (sic), and the island is named as Ellangowan (sic) Island.

[23] Named for a Government Patrol Officer, or *kiap*, called Thompson, see also Footnote 19.

[24] D'Albertis named the Alice River in honor of his acquaintance, Miss Alice Hargrave.

[25] Snake Point is now known as D'Albertis Junction.

[26] From the description of the python as similar to *Liasis amethystinus* (= *Simalia amethystina*), but being metallic blue, it sounds more like a Boelen's python, *S. boeleni*, a montane species found throughout the Central Cordillera but at higher elevations.

D'Albertis's 3rd Fly River Expedition.—Buoyed by the success of his 1876 expedition, but also disappointed at not quite achieving his ambition of reaching the mountains, D'Albertis embarked on his third ascent of the Fly River in May 1877, reaching Snake Point (Fig. 11.3) and the Alice River by 13 June where he found the water levels were much lower than on his previous visit. The *Neva* continued up the Fly but failed even to reach Palmer Junction and he was forced to halt considerably short of his destination (Fig. 11.6) due to the shallowness of the river. Despite low water levels, sickness in the crew and himself, continual attacks by Papuans, the death of one Chinese crew member, the disappearance of another, and the desertion and presumed subsequent deaths of the final three Chinese crewmen, D'Albertis persevered with his biological collecting until 15 June (Goode 1977) when he turned the *Neva* south again. His hopes to again explore the Alice River were also dashed by diminished river levels. However, the days that the *Neva* was grounded allowed plenty of time for biological collection and D'Albertis was once again within the low montane rainforest habitat of *Toxicocalamus* and could have obtained the specimen of *T. p. angusticinctus* at any time between June and October 1877, or June–July 1876. Not only did D'Albertis venture beyond the later type locality for *T. p. angusticinctus*, 10 km S of Palmer Junction (Fig. 11.7: AMNH R-57511–12), he also spent field time close to two locations where *Toxicocalamus* have subsequently been collected, such as Matkomrae on the Ok Mart (Fig. 11.8: *T. stanleyanus* MCZ R-121550; *T. p. angusticinctus* MCZ R-121551, 141008), and Ningerum on the Ok Tedi (Fig. 11.9: *T. stanleyanus* MCZ R-140988; *T. p. angusticinctus* MCZ R-140753, 140989, 141007, PNGM 22159, USNM 217500). Any of these locations are more likely localities for the specimen's origin than Katau. Thus, this specimen is yet another example of an erroneous environment.

LESSONS TO BE LEARNED

The examples of the three *Toxicocalamus* specimens, in addition to those of *Malayopython timoriensis*, *Cryptoblepharus schlegelii*, *Sistrurus catenatus*, and *Vini peruviana*, provide insights into the difficulty that often accompanies assessments of distribution when few specimens are available and when imprecise records accompany historically important specimens. This is a problem that has plagued taxonomic surveys of many collections made during colonial times, where collectors had to pass their specimens to shippers or where unscheduled stops produced additional specimens whose data became intermingled with those from other locations. There are still many such conundrums that await resolution, particularly when it concerns widespread perianthropic species (e.g., the *Hemidactylus brookii* complex; Kathriner et al. 2014).

CONCLUSIONS

These varied histories showcase the importance of reliable locality determination during specimen collection, which really is not news and not difficult in the age of GPS coordinates; one would assume that any scientist who collects specimens today would consider accuracy in the description of collecting localities a key best scientific practice. What we hope will give our readers pause when perusing the above accounts is that, even today, decades or even over a century after collection, it may still be possible to backtrack in time and search for evidence of collecting localities that may have been considered

lost or doubtful. Perhaps readers could be encouraged to try some sleuthing on their own when they encounter incongruous locality data. In this regard, we wish to raise the point that *especially* today, with hundreds and thousands of gigabytes of internet information at our fingertips, a foray into forensic historic sleuthing may be both highly rewarding and exhilarating, and lead to a better understanding of the species in all of our respective herpetological niches. Surely historians and librarians the world over will be excited to engage in Holmesian quests that tie together the humanities and scientific discovery.

Acknowledgments.—We thank the following collection managers, curators, and museum administrators for providing access to the collections under their care or for arranging loans of pertinent material: Ross Sadler, Jodi Rowley, and Sandy Ingleby (AM); David Dickey and David Kizirian (AMNH); Allen Allison, Kathleen 'Pumehana' Imada, Nicholas Griffiths, and Molly Hagemann (BPBM); Patrick Campbell (BMNH); José Rosado and Joe Martinez (MCZ); Giuliano Doria, Massimo Petri, and Maria Bruna Invernici (MSNG); Bulisa Iova (PNGM); Carolyn Kovach and Steven Richards (SAMA); Paulus Keip (UPNG); Jeremy Jacobs, Kenneth Tighe, and Robert Wilson (USNM); and Frank Glaw and Michael Franzen (ZSM). We also thank Glenn Shea (University of Sydney) for identification of *Laticauda* and the lizards in the Charles W. Camp collection, and Andrew Black (University of Wolverhampton) for receiving loans on behalf of one of us (MOS). We would also like to thank Sam Sweet and an anonymous reviewer who read and made a number of invaluable comments on this paper.

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- APPENDIX 1. SPECIMENS EXAMINED**
- TOXICOCALAMUS HOLOPELTURUS* (N = 18).**—PAPUA NEW GUINEA: MILNE BAY PROVINCE: Rossel Island: Mount Rossel (elev. 205–700 m; 11.3550°S, 154.2247°E), AMNH R-76660 (holotype), BPBM 20823–33, PNGM 25194; Cheme (elev. 55 m; 11.3231°S, 154.2428°E), BPBM 20835–36; Mount Yuvu (elev. 450 m; 11.3680°S, 154.1053°E), MCZ R-156548; Gobubob (elev. 336 m; 11.3353°S, 154.2222°E), PNGM 25193.
- TOXICOCALAMUS LORAE SENSU LATO* (N = 5).**—PAPUA NEW GUINEA: CENTRAL PROVINCE, OWEN STANLEY RANGE: Dinawa (elev. 1220 m; 8.5833°S, 146.9167°E), BMNH 1946.1.14.53 (holotype of *Apistocalamus pratti*); Mafulu (elev. 1270 m; 8.5022°S, 147.0719°E), AMNH R-59067 (as *A. pratti*), BMNH 1935-5-10.174; Fane to Bellavista road (elev. unknown; 8.55483°S, 147.0780°E), PNGM 23158; Tapini (elev. 880 m; 8.3631°S, 146.9589°E), USNM 195619.
- TOXICOCALAMUS LONGISSIMUS* (N = 17).**—PAPUA NEW GUINEA: MILNE BAY PROVINCE: Woodlark Island, without precise locality data, BMNH 1946.1.18.92–93 (paralectotype, lectotype); Guasopa (elev. 12 m; 9.2258°S, 152.9478°E), AM R.124858, 124904, BPBM 17885–87; Kulumandau (elev. 53 m; 9.0847°S, 152.7175°E), AMNH R-76619, 76629–30, BPBM 42185; Unapoi Homestead, W shore of Suloga Harbour (elev. 80 m; 9.1986°S, 152.7314°E), BPBM 17888; Waimunon road, SW Waimunon Bay (elev. 72 m; 9.0761°S, 152.8361°E), BPBM 39702; Dikoias (elev. 73 m; 9.0422°S, 152.7497°E), BPBM 42183–84. Fergusson Island: (in error), BMNH 1904.11.1.60. No locality data, AM R.46845.
- TOXICOCALAMUS MINTONI* (N = 1).**—PAPUA NEW GUINEA: MILNE BAY PROVINCE: Sudest Island, Mount Riu, (elev. 410 m; 11.4958°S, 153.4239°E), BPBM 20822 (holotype).
- TOXICOCALAMUS MISIMAE* (N = 6).**—PAPUA NEW GUINEA: CENTRAL PROVINCE: Mekeo region (in error): (09.000°S, 146.833°E), AM R.7614. MILNE BAY PROVINCE: Misima Island: Mararoa, Mount Sisa (elev. 350 m; 10.6556°S, 152.8058°E), AMNH R-76684 (holotype); Bagilina, Mt. Oia-Tau (elev. 128 m; 10.6539°S, 152.6717°E) BPBM 17231; Umuna Mine (elev. 130 m; 10.6642°S, 152.8100°E) AM R.125026; Misima Mine (elev. 180 m; 10.6589°S, 152.7961°E), SAMA R69921; Bulai Plantation (elev. 180 m; 10.6500°S, 152.7500°E); SAMA R69924.
- TOXICOCALAMUS NIGRESCENS* (N = 2).**—PAPUA NEW GUINEA: MILNE BAY PROVINCE: Oya Waka, Fergusson Island (elev. 990 m; 9.4578°S, 150.5583°E), BPBM 16545 (holotype). Fergusson Island: Basima (elev. 10 m; 9.4664°S, 150.8319°E), BPBM 16544 (paratype).
- TOXICOCALAMUS PREUSSI PREUSSI* (N = 4).**—WEST NEW GUINEA: PAPUA PROVINCE: Central Mamberamo Regency, SW Bernhard Camp, Taritatu (=Idenberg) River (elev. 856 m; 3.5131°S, 139.1611°E), AMNH R-62469–72.
- TOXICOCALAMUS PREUSSI ANGUSTICINCTUS* (N = 12).**—PAPUA NEW GUINEA: WESTERN PROVINCE: North Fly District, Palmer Junction, Fly River (elev. 53 m; 6.0058°S, 141.4994°E), AMNH R-57511–12 (paratype and holotype); Olsobip, Fly River (elev. 445 m; 5.3889°S, 141.5167°E) PNGM 24584, UPNG 1613; Ningerum, Ok Tedi (elev. 83 m; 5.6733°S, 141.1422°E) MCZ 140753, 140989, 141007, USNM 217500; Tabubil, Ok Tedi (elev. 475 m; 5.2769°S, 141.2269°E; AM R.127468, UPNG 5665; Matkomrae, Ok Mart (elev. 51 m; 5.8244°S, 141.1592°E) MCZ 121551, 141008. South Fly District (in error): "Katau," Binaturi River (elev. sea level; 9.1419°S, 142.9533°E), MSNG 54100.
- TOXICOCALAMUS STANLEYANUS* (N = 10).**—PAPUA NEW GUINEA: CENTRAL PROVINCE: Owen Stanley Range, Dinawa (elev. 1220 m; 8.5833°S, 146.9167°E), BMNH 1946.1.14.53 (holotype of *T. stanleyanus*), BMNH 1904.3.17.13; Madew (elev. 1220 m; 8.6083°S, 146.9161°E), BMNH 1908.10.14.10–12; Mafulu (elev. 1270 m; 8.5022°S, 147.0719°E), AMNH R-59063, BMNH 1935.5.10.171–73; Maeaera Plantation, Angabanga River (elev. 10 m; 8.6767°S, 146.5089°E), ZSM 52/2000.